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MAGNETIC FOREIGN BODIES IN THE EYE

WITH REPORT OF 136 CASES

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I had planned a paper to be entitled "Foreign Bodies in the Eye," which would have included all foreign substances, of whatever material, which might have entered the eye. However, inadequate time has limited this paper to those foreign bodies having magnetic property, and the more comprehensive report will be made later.

Formerly it was believed that a foreign body within the globe was a desperate condition and enucleation imperatively demanded for fear of sympathetic involvement. Since the use of x-ray for localization and the electric magnet for removal, iron and steel can be localized and withdrawn, with the knowledge that sympathetic inflammation will be unlikely to follow. I have seen no sympathetic ophthalmia follow injury by magnetic bodies and but one following injury by non-magnetic bodies. Roemer states that not more than one to three percent of all eyes injured in any manner, by whatever material, in which inflammatory changes have developed, were followed by sympathetic inflammation.

In a large number of injuries where both eyes were injured, it has frequently been impossible to decide immediately which eye was going to be the seeing one; therefore, we have learned to delay the removal of either eye until a very definite conclusion on this point has been reached. We promptly enucleate eyes irreparably damaged, when it is thought no visual possibility remains, doing so for cosmetic and economic reasons (v. Cases 2, 7, 10, 13, 15, 24, 28, 49, 68, 80, 84, etc.).

Foreign bodies other than iron can be removed only by forceps or some grasping means. In removing iron, the magnetic pull produces much less trauma than results from removal of other substances. Fewer infections follow the entrance of iron or steel than of stone or other foreign material. The penetration of copper is especially liable to produce a pus focus, although I have seen at least two cases where it has not done so. It is possible that iron and steel may be sufficiently heated by the force of the blow which fractures it, to produce sterilization of the flying fragment.

It is needless to say that a foreign body should be extracted early. Iron, usually not carrying infection with it, frequently comes to rest within the globe and becomes encysted or otherwise fixed, and may be carried there indefinitely. (v. Cases 19, 47, 74, 86, 98, 117, 127, 128, 129, 131.)

Haab and Morax have presented statistics indicating that objects weighing one milligram are the smallest that can be removed by the magnet. Rollet controverts this opinion by reporting a case in which a particle weighing only four-tenths of a milligram was extracted.

When a foreign body is small and located in the anterior portion of the globe, or in the lens, extraction should be made preferably through the anterior route, especially when the lens has already been traumatized. (v. Cases 16, 33, 44, 56, 63, 73, 77,

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85, 91, 97, 106, 123, 126, 130, 132.) Even small bodies deep in the vitreous probably give better results when thus removed, (v. Cases 46, 78, 83, 110, 118, 120, 121, 122, 125, 129.) although Allport limits the use of the giant magnet and the anterior route to cases in which the foreign bodies lie in the lens or in front of it.

On the other hand, foreign bodies of large size, when located in the posterior segment of the globe, or even if small and the lens is clear, should be extracted through a scleral opening. (v. Cases 27, 34, 51, 62, 65, 75, 90, 101, 109, 114, 115, 136.)

Jackson's measurements of 4500 persons showed that the average protrusion of the apex of the cornea in front of the outer margin of the orbit was over seventeen millimeters. With this statement in mind, we have suggested to the radiographer the use of a dental x-ray film, placed deeply between the nasal angle and the inner canthus, the ray to be directed from the temporal side. This method was successful in Case 131 in which a foreign body was located so deeply imbedded in old scar tissue of the cornea that a point of it protruded into the anterior chamber. Having decided that we were dealing with steel, we operated with the current on, thus holding the foreign body in place while cutting down upon and extracting it, and in this manner avoiding the possibility of its falling into the anterior chamber.

Allport objects to the introduction of the magnet point into the vitreous, unless all other methods have failed. In instances where the giant magnet will apparently be too powerful and produce additional trauma, we use a flexible cable extension of fifteen inches, attached to the large magnet head, which lessens the pulling force.

The removal by the anterior route frequently results in the foreign body becoming entangled in the iris, in which case iridectomy may become necessary. (v. Cases 11, 16, 42, 58, 83, etc.) This is not disastrous; on the contrary, it is advantageous in avoiding an occlusion of the pupil following a high degree of iritis or iridocyclitis; furthermore, it may be of advantage, in a later extraction of a traumatic cataract.

Iron gives the minimum of damage when it is located in the lens body, and may produce little trouble other than a change in the color of the lens and the probability of a traumatic cataract presenting. (v. Cases 36, 97, 123). Siderosis bulbi is an impregnation of the ocular tissues, resulting from chemical changes brought about when the eye fluids come in contact with the Ziron. (v. Cases 23, 36, 45, 46, 51, 57, 86, 106.) It appears in those cases in which iron remains some time within the globe, though it may appear in a few days after the entrance of the metal into the globe.

Failure of response to the action of the magnet may be due to several causes: (1) insufficient strength of the magnet or particle too small (v. Cases 47, 75); (2) too small an opening in the sclera; (3) foreign body encapsulated in organized tissue or wedged in the wall of the sclera; (v. Cases 10, 12, 13, 14, 15, 21, 45, 108); (4) the passage of the foreign body entirely through the globe into the tissue of the orbit. (v. Cases 40, 69.) When as much as thirteen percent of manganese is used in steel, as is the case with that form of steel used by some manufacturers of automobile axles, little magnetic attraction exists, and in such cases the foreign body fails to respond to the pull of the magnet. Case No. 127 deals with a foreign body of this character, as was proven by testing the axle from which the foreign particle was detached.

Foreign bodies should be localized by x-ray before application of the magnet, for obvious reasons. In addition to the aid in accurate use of the magnet, afforded by localization, sometimes it is found that the foreign body has passed through the globe, or has traumatized the eye externally without entering the globe. In such cases, either the body should not be disturbed, or, if removed, further trauma to the eye can be avoided. (v. Cases 40, 66, 69, 99, 112, 124.)

Extraction of a traumatized lens is usually performed at the request of industrial business. Corporations are anxious to perform all possible service to an injured man, if for no other reason than to avoid criticism; furthermore, they wish to conserve valuable earning time to the injured man. It is economy to them, and the patient is better satisfied when the work is thoroughly done. Several cases were noted, following cataract extraction, where accommodation seemed to be retained, the same refracting lens being used for reading as for distance. W. B., Case No. 106, was an instance of this. It was also noted in a boy (W. V.), age six, who lost one eye and had a perforating injury to the other, from the explosion of a dynamite cap (copper). A traumatic cataract was later extracted from the remaining eye and with a plus

twelve spherical, plus three, axis seventy-five, he had 20/20 vision for distance and with the same lens was able to read J. No. 1 at ten inches. He still carries a piece of copper in the remaining eye. This boy attended school and in manhood engaged in the occupation of underground mining. We attribute this remarkable phenomenon to a probable movement of the vitreous in such a manner as to increase its antero-posterior curvature, and thus its refractive index.

I present below a brief summary of one hundred and thirty-six cases of magnetic foreign bodies in the eye. The following statistical resume of these cases may be of interest:

Right Eye	47
Left Eye	72
Eye not Recorded	17
Through Cornea	107
Through Sclera	12
Not Recorded	17
Iris Injured	45
Injury to Lens	55
Lens Extracted	15
Foreign Body Located by Fluoroscope	1
Localized by X-ray	119
More than One Foreign Body in Globe	1
Foreign Body in Lens	3
Foreign Body in Cornea	6
Foreign Body in Anterior Segment	34
Foreign Body in Vitreous	60
Foreign Body Embedded in Sclera	15
Foreign Body Not in Globe	3
Foreign Body Passed Through Globe	6
Not Localized	9
Foreign Body Extracted Through Anterior Route	54
Extracted through Posterior Route	32
Extracted through Wound or Entrance	15
Magnet Negative but Steel Found upon Enucleation	4
Siderosis Bulbi	10
Foreign Bodies Not Extracted for Various Reasons	24
Secondary Glaucoma	1
Enucleation	22

Vision was not always recorded, subsequent to operation. The minimum vision for industrial purposes is fixed at 20/200. We record forty-nine cases with vision of 20/165 or better, following extraction of foreign body by magnet.

The x-ray work done prior to 1910 was performed by me with a static x-ray machine brought to Phoenix in 1898. From 1910 to 1916, the localizations were made by Dr. Wm. H. Sargent, formerly of Phoenix and now located in Oakland, Calif.; since 1916, the localizations have been made by Dr. W. Warner Watkins and Dr. H. P. Mills, both of the Pathological Laboratory, Phoenix, Ariz. For the accurate and skilful work done by these three radiologists the author is much indebted.

SUMMARY OF CASES

1. G. D., Jan. 15, 1896. Piece of steel went through left cornea, wounding iris; cataract followed. No magnet available. Not disturbed. No subsequent observation recorded.

2. R., Sept. 17, 1896. Piece of iron into right eye five days before. Wound infected; hypopyon. No magnet. Enucleated.

3. R. B., Aug. 27, 1897. Piece of steel through left cornea, lodging in anterior chamber. Removed by small magnet, anterior route.

4. E. P., Aug., 1899. Piece of steel through cornea; iris prolapsed and was excised. Extraction not attempted. Vision 15/65.

5. E. P., Feb. 15, 1900. Wounded by piece of steel through right cornea in August, 1899. No extraction.

6. G. S., Jan. 31, 1901. Piece of steel through right cornea Jan. 2, 1901. Marked infection; vision nil. Enucleation.

7. L. K., Oct. 20, 1901. Foreign body through right cornea on Oct. 3rd. Cataract; vision nil. **Particle visible by fluoroscope** deep in fundus. Piece of steel 3 by 3 by 4 mm. extracted by magnet, posterior route. Enucleation.

8. E. H., Nov. 4, 1901. Foreign body through left cornea. Piece of steel extracted through wound of entrance, anterior route, following iridectomy. On Dec. 9, 1901, vision was 15/65.

9. R. A., Dec. 1, 1901. Foreign body in cornea three weeks ago. Iritis. Piece of steel removed by magnet, anterior route. Good recovery.

10. W. H., Dec. 16, 1903. Foreign body through right cornea in April, 1903. Large leucoma of cornea; phthisis bulbi; occluded pupil; tension markedly minus; photophobia and lachrymation. Magnet negative. Some sympathetic irritaiton was present and injured eye was enucleated. Piece of steel was found buried in posterior scleral wall.

11. C. B., May 8, 1904. Foreign body through cornea of left eye five days ago. seen lying in corneo-iritic angle. Upon application of magnet, body became entangled in iris and was removed by forceps after iridectomy, being piece of steel 2 by 3 mm. in size. Vision not recorded.

12. G. W. L., Sept. 5, 1904. Foreign body through cornea of left eye, following external scleral wall under bulbar conjunctiva; subconjunctival hemorrhage. Magnet unsatisfactory; ophthalmoscope negative; no further attempt at removal. Vision 15/15.

13. E. A. B., Oct. 21, 1904. Foreign body through corneal limbus of left eye. Wound septic; extensive vitreous hemorrhage; no light perception. X-ray examination negative. Magnet negative. On Oct. 26th hypopyon had developed and eye was enucleated. Piece of steel 1½ by ⅜ mm. was found engaged in and protruding through the sclera at a point opposite the wound of entrance; focus of pus surrounded the foreign body.

14. F. A., Aug. 2, 1905. Foreign body through the sclera just without the sclero-corneal limbus. X-ray showed particle in globe but did not definitely localize. Wound was enlarged and magnet applied, but failed to extract. Eye was enucleated and particle of steel found imbedded in scleral wall.

15. R. J. M., Nov. 27, 1905. Foreign body through cornea of right eye. Magnet was positive but pull not sufficient to extract. Eye was enucleated and piece of steel with sharp point at one end and rolled into spiral at the other found entangled in the intra-ocular structures.

16. I. F., Sept. 11, 1906. Foreign body through cornea of right eye. Could be seen entangled in iris and piece of steel was extracted through wound of entrance, following iridectomy. Result excellent.

17. R. R., May 15, 1907. Foreign body through cornea of left eye. Piece of steel seen entangled in iris and removed by anterior route. Vision 20/20.

18. G. C., Feb. 15, 1908. Foreign body through cornea of left eye. Piece of steel 1 by 3 mm. extracted by magnet through anterior route. Vision 7/200.

19. A. W. S., Mch. 1, 1908. Piece of steel in left eye since 1861. Still present in fundus, with lenticular opacity and vision 15/100. Eye quiet and no attempt at extraction.

20. A. R., Mch. 3, 1908. Foreign body through cornea of left eye; iris torn, lens opaque. Uncertain as to character of foreign body but history indicates steel; magnet unsatisfactory; no further attempt at removal.

21. J. A. R., Mch. 3, 1908. Foreign body, probably steel, through cornea of left eye. Prolapsed iris excised; lens opaque. Giant magnet negative. On Aug. 8, 1921, eye quiet, aphacic, iris tremulous; x-ray showed foreign body with density of iron in globe. No attempt at removal. No light perception.

22. T. F., Mch. 14, 1908. Foreign body, probably steel, through cornea of left eye. Coloboma of iris; cataract. Magnet unsatisfactory. No further attempt at removal.

23. W. S. M., Mch. 4, 1908. Steel into right eye; coloboma of iris; cataract; siderosis; no extraction.

24. J. J. H., Mch. 14, 1908. One year previous, piece of steel went through right cornea. Iris wounded; complete annular posterior synechia; cataract; siderosis; glaucoma; tension plus 2. Enucleation.

25. M. R., Mch. 1, 1909. Particle of steel through cornea and lens of right eye. Extracted by magnet through wound of entrance. Enucleated later.

26. C. A. T., Aug. 23, 1909. Piece of steel located in left cornea ten days previous, deeply buried. Several unsuccessful attempts at its removal by spud. Extracted by magnet. Vision unimpaired.

27. J. H., Jan. 31, 1910. Particle steel through cornea, iris and lens of right eye. Could be readily seen. Particle of steel 4 by 4 by ½ mm. extracted by magnet, posterior route. Vision largely impaired because of subsequent cataract.

28. M. M., Aug. 10, 1910. Piece of rivet head through left cornea on nasal side. Shown in globe by x-ray. Panophthalmitis; hypopyon. Enucleation.

29. J. D., May 20, 1911. Piece of steel into right eye, entangled in iris. Iridectomy downwards, and removal through anterior route by magnet of steel 4 by 5 by 1 mm. in size. Light perception.

30. J. M., May 31, 1911. Piece of steel through cornea of right eye. Removed by magnet, anterior route.

31. J. H., July 1, 1911. Piece of steel through cornea of left eye. Degenerated iris; pupil occluded; tension minus 2. Light perception only. Removed by magnet, anterior route, July 1, 1915.

32. J. V., Sept. 2, 1911. Foreign body through cornea of left eye, shown by x-ray. Negative to magnet. Foreign body could be seen in irido-corneal angle, nasal side. Possibly slag. Not removed. On Sept. 28, 1911, vision was 20/30, minus two.

33. S. R., Oct. 16, 1911. Foreign body through the sclero-corneal junction of left eye, wounding iris and lens. Piece of steel 1 by 3 mm. extracted by magnet, anterior route. Vision 20/30.

34. J. D., Mch. 18, 1912. Foreign body through sclera just outside of limbus. Magnet negative through wound of entrance, but extraction of particle of steel effected through scleral opening. Tension minus two; vision, light perception.

35. O. A., Oct. 10, 1912. Foreign body through sclera of right eye, four millimeters below limbus. Lens opacity. Piece of steel 10 by 5 by 2 mm. extracted through wound of entrance. Vision not taken.

36. A. R., May 22, 1913. Foreign body through cornea of right eye. On Feb. 24, 1914, showed cataract, pain, tension plus, siderosis iris; vision light perception. X-ray was negative. Iridectomy upwards with lens extraction; lens found firm and discolored by small piece of steel imbedded in it. Vision 15/20 with plus 11 plus 3 axis 180.

37. H. H. Y., July 12, 1913. Foreign body through cornea of left eye. Cataract. Magnet negative. Poor light perception. Pain, hypopyon. Enucleation and particle of steel 2 by 5 mm. found in posterior scleral wall.

38. L. S., Sept. 6, 1913. Piece of steel obliquely into left cornea, penetrating into anterior chamber. Small hypopyon. Extraction by magnet, anterior route. Vision not recorded.

39. N. R., Oct. 3, 1913. Foreign body through sclero-corneal junction of right eye. Prolapsed iris, amputated; lens opaque. Particle of steel removed by magnet through wound of entrance. Vision, light perception.

40. R. H. H., Nov. 3, 1913. Foreign body, supposedly steel, through right cornea; wound of iris; lens opaque; magnet negative at wound of entrance. Sclera opened and tip of magnet introduced with negative results. X-ray examination showed dense particle high up in orbit, apparently outside of globe. No further attempt at removal. Vision 4/200.

41. J. W. M., Dec. 19, 1913. Piece of steel in left eye ten days before; buried in sclera; particle 2 mm. in diameter removed by magnet. Vision undisturbed.

42. D. L., Dec. 21, 1913. Foreign body through left cornea; lens opaque. X-ray localized foreign body in lens. Wound enlarged and steel withdrawn by magnet. Iris prolapsed and amputated. Lens absorbed. Feb. 24, 1924, vision 15/15 with plus 12 plus 150 axis 165.

43. S., Dec. 27, 1913. Particle of steel imbedded in left sclera. Removed by magnet.

44. H. S., Oct. 26, 1914. Particle of steel through right cornea. Wound of iris; cataract. Extracted by magnet through wound of entrance. Iris prolapsed but replaced. Lens extracted. Vision 20/40, Mch. 1, 1915.

45. F. M., Sept. 10, 1914. Foreign body through right upper lid into globe. Vision 3/200; siderosis iris. X-ray showed particle in lower nasal quadrant. Magnet negative through scleral opening. Enucleated Oct. 15, 1914, finding piece of steel 4 by 2 by 2 mm. in scleral wall.

46. R. O. B., Mch. 27, 1915. Foreign body through cornea of left eye; siderosis iris; coloboma iris; lens opaque. X-ray localized particle in vitreous chamber. Extracted by magnet anterior route. Proliferating retinitis; cholesterin crystals. Vision 15/70.

47. J. C., Apr. 3, 1915. Foreign body, probably thin scale from boiler upon which he was hammering, through cornea of left eye. Cataract. X-ray unsatisfactory because of small size of body and lack of density, but is shown in vitreous chamber. Magnet did not change position of body in vitreous chamber. Cataract extracted. Vision 15/40 with plus 12.

48. L. R., Apr. 6, 1915. Foreign body into left eye, localized by x-ray in vitreous chamber, antero-inferior-nasal field. Removed by magnet posterior route. Vision, fingers at three feet.

49. R. L., June 24, 1915. Foreign particle into right eye, localized by x-ray in vitreous chamber. Particle of steel 4 by ½ mm. removed by magnet, posterior route. Purulent changes. Enucleation July 29, 1915.

50. H. H. B., July 21, 1915. Foreign body through left cornea. X-ray shows particle in anterior chamber. With magnet, piece of steel, 3 by ½ by ¼ mm. extracted, anterior route. Vision 15/20 plus with plus 75 sphere.

51. E. P. R., Aug. 10, 1915. Foreign body through sclero-corneal junction left eye. Siderosis iris; retinal detachment upper nasal field. X-ray shows dense foreign body in vitreous. Piece of steel extracted by magnet, posterior route. Light perception only.

52. J. C. S., Aug. 28, 1915. Foreign body, probably steel, through right cornea. Coloboma iris; cataract; x-ray shows particle in anterior segment of globe. Application of magnet refused.

53. I. C., Aug. 31, 1915. Foreign body through left cornea into vitreous; iris in-

jured; cataract; hypopyon; particle of steel 3 by 3 by 1½ mm. extracted by magnet through wound of entrance. No light perception.

54. F. F., Sept. 11, 1915. Piece of steel into right eye. Extracted by magnet, posterior route. Vision 3/200.

55. J. C., Sept. 17, 1915. Foreign body into left eye, June 3, 1915. X-ray showed dense particle in vitreous. Piece of steel 2 by 2 by 1½ mm. extracted by magnet, posterior route. No light perception.

56. L. B., Sept. 19, 1915. Steel through the cornea. X-ray showed particle above and to nasal side in anterior segment. Piece of steel 3 by 1 mm. extracted anterior route. One month later, vision 15/40.

57. A. W., Sept. 27, 1915. Piece of steel through the right cornea four years previous. Siderosis; cataract absorbed; discission opaque capsule, and extraction by magnet anterior route.

58. E. B., Nov. 2, 1915. Foreign body through right cornea, entangled in iris and ciliary body. Iris amputated and piece of steel ¼ by 1 by 6 mm. extracted by magnet through wound of entrance.

59. A. W. S., Dec. 29, 1915. Piece of steel into left eye. X-ray showed particle on temporal side of orbit near apex. Not removed. March 9, 1917, eye quiet. Foreign body in situ; cataract; vision, hand movements only.

60. W. H. H., Feb. 1, 1916. Foreign body wound through cornea, iris and lens of right eye. X-ray showed particle in vitreous against posterior wall of globe. Removed by magnet through scleral opening. Enucleation on account of panophthalmitis.

61. K. I. B., Mch. 23, 1916. Piece of iron, size of pin head into anterior chamber of right eye. Removed by magnet.

62. F. E., June 16, 1916. Foreign body into right eye. X-ray showed dense particle 4 by 2 mm. in temporal wall of globe two discs width to temporal side of macula. Piece of steel extracted by magnet by posterior route below site of location. Vision on June 21, 1916, 15/15 minus 3.

63. E. L. M., June 25, 1916. Piece of steel through right cornea. X-ray showed particle in superior pupillary area. Extracted by magnet, anterior route. Vision July 17, 15/15 minus five.

64. H. A., June 20, 1916. Piece of steel through right cornea. X-ray showed particle in vitreous. Cataract. Extraction by magnet, anterior route. Vision not recorded.

65. C. M. S., Nov. 8, 1916. Three weeks ago, piece of steel through right cornea. X-ray localized in anterior portion of vitreous chamber. Piece of steel 6 by 2 by ¼ mm. removed by magnet posterior route. Lens extracted. Vision 15/30 with plus eleven sphere.

66. N. Y. B., Dec. 25, 1916. Piece of steel through the sclero-corneal junction of left eye. Iridodialysis; lens opaque. X-ray showed foreign body 6 by 4 by 2 mm. in apex of orbit, evidently having passed through the globe. No light perception; optic nerve probably severed. Foreign body not disturbed.

67. M. S. H., Jan. 9, 1917. Foreign body through the corneal limbus. Coloboma iris; hypopyon; cataract. X-ray localized dense foreign body on floor of vitreous midway between fundus and lens. Piece of steel 4 by 2 by ½ mm. extracted by magnet posterior route. Vision nil.

68. J. S. G., Mch. 21, 1917. Foreign body through left cornea. Iris prolapsed and amputated. X-ray showed dense body 5 by 4 by 2 mm. just behind lens in vitreous. Extracted by magnet through wound of entrance. Panophthalmitis and enucleation March 29th.

69. J. B., Apr. 2, 1917. Piece of steel through right cornea. Magnet applied without result. Vision July 20, 1917, 7/200. Lens clear; mass of floating shreds in vitreous. X-ray showed foreign body posterior to globe, evidently having passed through. No further attempt at removal. May 8, 1924, vision 15/15 with plus 1.75 axis 105.

70. R. T. M., Apr. 7, 1917. Foreign body through left cornea. Coloboma iris; cataract. Piece of steel extracted by magnet, posterior route May 8, 1917. Vision, light perception.

71. A. V., Apr. 9, 1917. Steel into left eye one year ago. X-ray showed large dense particle 4 by 3 by 5 mm. in vitreous chamber. Unable to extract by magnet, posterior route. Enucleation April 13, 1917.

72. R. O. S., May 28, 1917. Piece of steel into left cornea. Removed by magnet. Vision 15/20.

73. R. M., July 5, 1917. Piece of steel through cornea of right eye. Traumatic lens with foreign body visible in lens, confirmed by x-ray. Extraction by magnet anterior route. July 31, 1925, extraction of lens. Vision 15/10 minus four with plus 12 plus 2 axis 180, and reads Jager No. 1 at thirteen inches with plus 16 plus 2 axis 180.

74. Jan. 19, 1918. A. W. Piece of steel through right cornea in April, 1903, below pupillary area. Coloboma iris; lens opaque.

X-ray localized dense particle 1 by 1 by 4 mm. in vitreous chamber. Hand movements at eight inches through opaque lens. Foreign body which has been in eye for fifteen years not removed.

75. E. S., Mch. 2, 1918. Piece of steel through left corneal limbus; coloboma of iris; opacity of lens. X-ray shows foreign body in vitreous chamber. Magnet negative as to anterior route. Extraction through posterior route, with subsequent extraction of lens. Vision 15/15.

76. P. J., Mch. 11, 1918. Foreign body in upper lid of left eye. Piece of steel 2 mm. in diameter removed by magnet.

77. O. A. L., Apr. 20, 1918. Piece of steel through left cornea, seen imbedded in iris. Particle 2 mm. in diameter extracted by magnet anterior route. Vision 15/40.

78. F. M., May 31, 1918. Piece of steel through left cornea. Coloboma of iris; opacity of lens. X-ray showed dense particle 2 by 4 mm. far back in vitreous. Extraction by magnet through wound of entrance, anterior route. Extraction of cataract. Vision 15/70 with plus 11.

79. L. C., July 22, 1918. Steel particle through left cornea, visible lying in anterior chamber. Particle 2 by 4 mm. removed by magnet through wound of entrance.

80. H. H., Aug. 12, 1918. Piece of steel in left eye. Localized by x-ray as particle 7 by 2 by 3 mm. in vitreous . Removed by magnet, posterior route. Panophthalmitis and enucleation.

81. L. F., Sept. 29, 1918. Piece of steel through left cornea. Lens opaque. X-ray showed dense foreign body in vitreous. Large piece of steel extracted by magnet, anterior route, after iridectomy upwards. Vision, light perception only.

82. Y. C., Oct. 9, 1918. Foreign body through left cornea. Iris prolapsed and amputated. Lens opaque. X-ray showed dense foreign body in vitreous. Magnet extraction through wound of entrance. Enucleation; vitreous filled with pus.

83. T. M., Oct. 4, 1918. Wound through left cornea. Cataract. X-ray did not show foreign body, but upon application of magnet, piece of steel appeared in anterior chamber from whence it was extracted after iridectomy, as particle was entangled in iris. Lens extracted at same operation. Particle 2 by 1/5 mm. On Dec. 26th, vision was 15/100 with plus 10 sphere.

84. C. L., Mch. 17, 1919. Scleral wound on right. X-ray showed foreign body partially within globe, partially posterior thereto. Piece of steel 18 by 6 by 1 mm. removed by magnet. Globe was split full length of floor with extensive hemorrhage into vitreous. Discharged April 5, 1919, with good appearance and good vision of of fingers at three feet. Eye later was enucleated.

85. H. C. A., May 11, 1919. Piece of steel through right cornea. X-ray showed foreign body in anterior segment opposite lower pupillary area. Piece of steel ½ mm. in diameter removed by magnet anterior route. Vision 15/100.

86. M. V., June 10, 1919. Piece of steel through left cornea six months previous. Vision hand movements only; coloboma of iris; siderosis of capsule; lens opaque. X-ray localized small foreign body ½ mm. in diameter in lens. Eye quiet. Not removed.

87. H. H. B., June 22, 1919. Wound through right cornea. X-ray showed large, thin foreign body 7 by 1 by ¼ mm. in vitreous. Cataract. Steel extracted by magnet, anterior route; iridectomy. No visual value.

88. S. M., Aug. 14, 1919. Wound through right cornea. X-ray showed fairly dense foreign body in vitreous. Piece of steel, 3 by 2 by 2 mm. extracted by magnet, posterior route. Hypopyon. Enucleated Aug. 19th.

89. Q. J., Sept. 3, 1919. Foreign body through left cornea. Coloboma of iris; cataract. X-ray showed dense foreign body 3 by 1 by 1 mm. in vitreous. Piece of steel extracted by magnet posterior route. Enucleated in December, 1919.

90. A. E., Sept. 20, 1919. Foreign body through left sclera. X-ray showed large, dense particle in vitreous. Wound of entrance was enlarged and piece of steel 6 by 3 by 2 mm. extracted by magnet, posterior route. Vision, light perception.

91. H. W., Dec. 9, 1919. Piece of steel in right eye for 28 days. Lens largely absorbed. X-ray showed dense foreign body in ciliary region, nasal side. Extraction by magnet, anterior route. Vision 15/40, with plus 11.50 sphere.

92. P. P., Dec. 24, 1919. Wound through the left sclera. Foreign body localized by x-ray in vitreous. Piece of steel 4 by 3 by 3 mm. removed by magnet through wound of entrance. Eye later enucleated.

93. B. M., Dec. 30, 1919. Piece of steel through left cornea. Extracted by magnet, anterior route.

94. R. C., Jan. 5, 1920. Piece of steel in lower lid of right side. Removed by magnet.

95. T. T., Feb. 7, 1920. Piece of steel through cornea; lens opaque. X-ray localized large dense particle just behind and

below the lens in vitreous chamber. Removed by magnet, posterior route. Vision, light perception.

96. J. M., six years old, Mch. 23, 1920. Left eye injured by flying steel. X-ray localized particle on sclera beneath external rectus. Piece of steel 5 by 3 mm. extracted by magnet under general anesthesia. Not subsequently observed.

97. W. J. W., Apr. 8, 1920. Piece of steel through right cornea. Coloboma of iris; lens opaque. X-ray localized particle in periphery of lens, nasal side. Extracted by magnet, anterior route. Cataract operated. Vision 15/20 with plus 12, plus 1, axis 30.

98. A. S., May 24, 1920. Piece of steel in right eye in 1909. According to statement of patient, Dr. Jackson, of Denver, advised not to remove if it did not cause irritation within two years. Traumatic cataract extracted one month after accident by Dr. Miller, of Los Angeles. Eye quiet and vision of hand movements upper field; macula of cornea. X-ray localized foreign body in posterior portion of globe.

99. L. P. W., May 28, 1920. While hammering on steel on May 12th, received foreign body wound through right sclera. Siderosis; intraocular hemorrhage; lens clear. X-ray showed dense foreign body in extreme apex of orbit, behind and above the globe. Not disturbed. Light perception.

100. J. J. D., June 17, 1920. Piece of steel in cornea of left eye two days ago. Removed by magnet. Not subsequently observed.

101. M. R., Sept. 18, 1920. Piece of steel through right cornea. Iris prolapsed and excised. Cataract. X-ray showed dense body in vitreous. Extraction by magnet, posterior route. Vision 15/20.

102. F. M. A., Oct. 23, 1920. Injury to right eye by piece of steel deeply imbedded in cornea. Removed by magnet, 4 by 3 by 2 mm. in size.

103. G. M. C., Dec. 11, 1920. Wound through left cornea. X-ray localized dense particle 2 by ½ mm. in vitreous. Coloboma of iris through which foreign body reflex is visible. Vision nil. Lens hazy. Particle of steel removed by magnet through posterior route. Occluded pupil; tension minus 2; vision, light perception.

104. C. R. W., Dec. 20, 1920. Particle of steel through left cornea two months ago. Iris traumatized; lens opaque. Body 1 by ½ mm. localized by x-ray just posterior to lens on temporal side. Extracted by magnet, anterior route.

105. O. A., Apr. 30, 1921. Piece of steel through right cornea. Lens swollen; light perception. X-ray localization shows large, dense foreign body 5 by 2 mm. in vitreous. Extraction by magnet, posterior route. Vision not recorded.

106. W. B., Nov. 26, 1921. Left eye injured by sliver of wood penetrating cornea and lens. Cataract extraction.

About July 1, 1923, injury to right eye by steel. Seen for this injury Sept. 4, 1923. Siderosis of iris; lens opaque. X-ray showed dense particle in anterior portion of lens. Removed by magnet anterior route. Cataract extracted May 7, 1925. On July 8th, vision in right eye 15/20; in left eye 15/20. This patient presented the anomaly of retained accommodation after lens extraction, being able to use the same correction for distant and near vision.

107. M. L. F., Aug. 20, 1920. While in auto race close behind another car, received foreign body in right eye. One month later showed much vision lost; corneal scar; absorbed lens; tremulous iris; fingers seen at one foot. X-ray showed dense foreign body, probably steel. Not removed.

108. B. S., Sept. 21, 1922. Injury through right cornea. Iron spicule could be seen in anterior chamber; lens opaque; magnet failed to extract account of barb which entangled cornea. Corneal opening enlarged and steel extracted by magnet through wound of entrance. Subsequent vision not recorded.

109. C. C., Oct. 4, 1922. Foreign body through left cornea. Cataract. X-ray showed large dense foreign body on floor of vitreous. Piece of steel measuring 6 by 5 by 2 mm. removed by magnet, posterior route. Vision 2/200 with cataract present.

110. J. L., Nov. 16, 1922. Piece of steel through right cornea. Coloboma of iris; lens opacity. Small, glistening foreign body visible two disc widths to nasal side of optic nerve, confirmed by x-ray localization. Removed by magnet, anterior route. Lens opacity unchanged. Vision 1/200, the reduced vision being probably due to lens opacity.

111. E. L. L., Feb. 16, 1923. Piece of steel in left globe. X-ray localized large foreign body just behind ciliary body, nasal side. Steel measuring 4 by 4 by 3 mm. extracted by magnet, posterior route. Vitreous infection. Enucleated.

112. B. A., Feb. 23, 1923. Piece of steel through right cornea. Traumatic iridectomy; cataract; x-ray showed large foreign body, 8 by 1 mm. posterior to globe and lodged against temporal wall of orbit,

having passed through the globe. No extraction. Vision, fingers at two feet.

113. F. W. H., Apr. 17, 1923. In 1897, left eye struck by flying steel which was not removed. Vision immediately lost. Lens opacity; annular synechia. X-ray showed dense foreign body 3 by 1 mm. in vitreous against the sclera on temporal side. Eye irritable, with photophobia and lachrymation. Advised enucleation.

114. D. S., June 26, 1923. Six days ago, wounded through left cornea. Cataract. X-ray showed two dense particles in lower portion of vitreous chamber. Two small pieces of steel removed by magnet, posterior route. Vision, light perception.

115. C. M., July 3, 1923. Foreign body through left cornea. Iris prolapsed and excised. Cataract. X-ray localized fairly large, dense particle in center of vitreous chamber. Piece of steel measuring 4 by 4 by 2 mm. removed by magnet, posterior route. Vision, light perception.

116. E. M., Oct. 30, 1923. Piece of steel imbedded in sclera of left eye, 4 mm. posterior to corneal limbus of temporal side. Confirmed by x-ray, and extracted by magnet. Vision 15/50.

117. H. T., Nov. 12, 1923. Injury to right eye two years ago. Eye now quiet; vision 15/20. X-ray localized dense particle, probably steel, on floor of vitreous. Refused magnet.

118. J. O., Nov. 13, 1923. Foreign body through left cornea. X-ray localization of small dense particle in lower segment of vitreous. Particle of steel extracted by magnet, anterior route. March 14, 1924, extraction of cataract. Subsequent vision, 14/20 with plus 12, plus .75, axis 90.

119. J. M. R., Dec. 5, 1923. While working on auto eight days previous, struck by piece of steel which was deeply imbedded in cornea, upper margin. Extracted by magnet.

120. P. M., Jan. 30, 1924. Piece of steel through left cornea. Cataract. X-ray localization of particle 1 by ½ mm. imbedded in the sclera near the nerve head. Extracted by magnet anterior route, through wound of entrance. Vision 20/40.

121. R. K., Feb. 1, 1924. Piece of steel in left globe. X-ray localized thin scale against the sclera in vitreous. Extracted by magnet anterior route. Operation performed for another surgeon. No record of subsequent vision.

122. J. H. C., Mch. 3, 1924. Wound through left cornea. X-ray localized dense particle 1 by 2 by 3 mm. on floor of vitreous. Piece of steel removed by magnet through wound of entrance, anterior route. On May 2, 1924, cataract extracted. Vision 15/15 with plus 12, plus 50, axis 75.

123. J. S., July 28, 1924. Wound through right cornea. X-ray showed small dense particle against lens in anterior chamber. Extracted by magnet anterior route. Cataract extracted Sept. 10, 1924. Vision 15/40 with plus 10 sphere.

124. D. L., Aug. 27, 1924. Wound of right cornea by flying piece of steel. X-ray localized particle external to globe in superior wall of orbit. More careful examination showed cornea not perforated, but hemorrhage in anterior chamber. Steel not extracted. Vision 15/15.

125. J. G., Oct. 4, 1924. Wound through left cornea; coloboma of iris; cataract. X-ray localized particle 2 by 1 mm. on floor of vitreous chamber. Piece of steel removed by magnet anterior route. Vision, light perception.

126. F. G., Oct. 30, 1924. Wound through left cornea. X-ray localization of dense particle 2 by ½ mm. deep in iritic angle. Extraction by magnet, anterior route. Iridectomy was performed and through this opening foreign body was drawn. Vision 15/70.

127. O. P., Jan. 13, 1925. Piece of steel into right eye. X-ray showed dense foreign body against the sclera near optic disc. Magnet failed to dislodge, account steel of non-magnetic character. Permitted to remain. Vision, light perception.

128. H. K., Mch. 4, 1925. Piece of steel in left eye ten years before; no light perception; iris degenerated; lens opaque; tension normal; eye quiet. X-ray localized dense body 2 by ½ mm. in lower segment of vitreous. No attempt at extraction.

129. J. P., May 18, 1925. Piece of steel into left eye several years ago; tension minus. X-ray localized dense particle 1 by ½ mm. in vitreous chamber just behind ciliary bory. Extracted May 25, 1925, anterior route. Infection followed. Globe retained with large macula of cornea. Vision, light perception.

130. W. J., June 27, 1925. Wound through corneal limbus. X-ray localized dense particle 2½ by 1 mm. in ciliary region nasal side. Particle of steel removed by magnet, anterior route. Tension minus. Vision, light perception.

131. J. L. R., July 4, 1925. Particle of steel in left eye since 1904. Eye irritable; cataract. X-ray localized small particle with density of steel imbedded in sclera of the fundus. Magnet declined. Vision, light perception.

132. H. H. B., July 19, 1925. Particle

steel in most pendant corneo-iritic angle. Particle 1-3 by 3½ mm. extracted by magnet. Vision 15/20 with plus 75 sphere.

133. M. W., Aug. 31, 1925. Spicule of iron imbedded in external temporal scleral wall. Removed by magnet.

134. M. I., Oct. 20, 1925. On Sept. 27th, a particle of steel in left eye. Found deeply buried in scar tissue of the cornea, a point presenting in the anterior chamber. Shown on small dental film by x-ray. Extracted by magnet, anterior route. Vision 20/20.

135. E. C. B., Dec. 15, 1925. Particle of steel through right cornea, horizontal temporal limbus. Intra-ocular hemorrhage; lens opaque. Piece of steel measuring 6 by 6 by 4 mm. removed through enlarged wound of entrance and after iridectomy. Enucleated later.

ADDENDUM.

136. A. A., Feb. 12, 1919. Right eye injured using air drill; dust blown into eye. X-ray shows foreign body 2 by 1 by 1 mm. in vitreous, below and to temporal side. On Feb. 14th, particle of steel removed by magnet, posterior route. On Feb. 20th, vision 15/30, eye quiet and wound about healed. On Feb. 25th. vision in right eye 15/50 and in left eye 15/15.

DISCUSSION

DR. S. A. SCHUSTER, El Paso, Texas: (Opening): "As you probably know I have been out of town for several months and did not know I was to discuss such an important paper as Dr. Martin's and on such an important subject, or I would have been prepared. Since hearing it, however, there is nothing I can say to add to the paper, but there are, I think, a few points that will bear emphasizing.

Any hard substance, provided it is propelled with sufficient force may penetrate the coats of the eye and become lodged therein. Steel, marble, coal, wood, lead, glass, copper percussion caps, have all been found in wounds.

The ability to remove a magnetic foreign body from the eye depends on its size, duration in the eye, and on the location of the substance. The foreign body which has penetrated into the interior of the eye may lie in the anterior chamber, be entangled in the iris, be in the lens, float free in the vitreous, or pass through the vitreous and become entangled in the retina and choroid. A foreign body after having passed through the vitreous chamber to the posterior wall may not have sufficient force to penetrate the coats of the eye a second time, and, after striking, rebounds, falling down into the vitreous chamber at its lowest point.

The prognosis of these cases depends upon the character of the substance, the location within the eye, the duration of the foreign body in the eye and its chemical reaction. However, the amount of reaction of the implanted foreign body depends not only on its situation and chemical nature, but very largely upon the organisms which may be carried into the eye with the foreign body.

The treatment of these cases Dr. Martin brought out very clearly and carefully, and the only point of practical and clinical interest I should like to mention is the fact that in all these traumatic cases we use some foreign proteid, probably milk as a routine treatment, especially in those cases of perforating injury of the eye.

DR. EDWARD JACKSON, Denver, Colo.: I think Dr. Martin draws on a larger experience than I have had with foreign bodies, although I have seen a good many. He mentioned incidentally one method of locating a foreign body that ought to be emphasized and called to the attention of the profession in general. He spoke of getting the location by placing the film inside next to the nose and getting the x-ray. Some of the first work done in locating foreign bodies in the eye was by that method, either placing the film alongside the nose, or inside the nose on the side that was to be examined.

About four years ago Vogt, now of Zurich, called attention to the detection of small foreign bodies with the x-ray, by taking the picture in through the soft tissues in front of the bony parts. Much has been done in x-ray localization. Sweet devised the most popular method, Mackenzie Davidson another, and still others. Their whole technic was based on the idea that the rays must be made to penetrate the skull and show the shadow of the foreign body as denser than the shadow of the bones. A few very small foreign bodies will not show a shadow through the bones of the head. But the most important place to locate small foreign bodies with the x-ray is in the anterior segment of the eye-ball. A good many of those that penetrate to the back part of the eye can be seen with the opthalmoscope, and located with it quite as readily as with the x-ray. Those that are in the ciliary region cannot be seen with the ophthalmoscope. They are the ones it is most important to locate accurately; and they are apt to be rather small foreign bodies. For them we have the plan of placing the film so that the rays can enter the wide space at the outer part of the orbit, which goes back farther than the center of the eyeball.

All that part of the eye can be taken with a softer tube than is required for penetration of the bone. It can be taken with shorter exposure, so that the soft tissues are very distinctly outlined. Such a film will often give the location, without any special locating apparatus, just as well as you can get it by special localizers. A very small foreign body of little thickness will cast a shadow upon such exposure.

This point needs to be emphasized, for the profession in general and for radiologists. I think if the question of a foreign body in the eye is decided by an x-ray examination, that the examination is far from complete, unless some such exposure is taken.

There are a good many cases on record now in which more than one foreign bdoy has been found in an eye. I remember one case in which five were found in the eye—fragments of steel which might be extracted by a magnet. Small fragments might be present and undetected, giving no sign for a month or two, or maybe a year afterward, but in the end causing very serious damage to the eye. That is the reason why any complete x-ray examination must include a short-time exposure, that shows the shadows of the soft parts and the smaller foreign bodies.

DR. RODERIC P. O'CONNOR, Oakland, Cal.: I have had several cases showing the importance of accurate localization. One in particular I recall in which I was called into consultation. The doctor proposed to make an opening in the sclera to extract the foreign body. At the time there was no x-ray localizing apparatus in Oakland and it had not been accurately localized. I insisted upon localization, however, and sent the patient over to San Francisco. A couple of sets of diagrams showed that in all probability the foreign body was behind the sclera in the orbit. That boy carries his

eye yet. He probably would not have it now had localization not been done. The diagram made with the Sweet apparatus located the foreign body.

DR. WARNER WATKINS, Phoenix, Ariz.: It has been my privilege to work with Dr. Martin in the localization of many of these foreign bodies. Dr. Martin is a very agreeable man to work with because he appreciates our difficulties and is not too captious in his criticisms.

There are some technical difficulties connected with localizing foreign bodies that are not always understood or appreciated. Many of Dr. Martin's cases are Mexicans and they are not always of a high degree of intelligence, and, while the Sweet localizer is perhaps as nearly perfect as any mechanical appliance, you must have cooperation of the patient or the work is not accurate. We recently had an illustration of this in which we found that a perfectly clear foreign body in the eye, one millimeter in diameter was completely wiped off the film by the person involuntarily moving the eye. If the object which is being x-rayed moves, we get no shadow, so that any voluntary or involuntary movement of the eye will give a photographic error. The Sweet machine is so constructed that you have to depend upon the patient fixing the eye and keeping it fixed. We try to have an assistant watch the eye we are not radiographing, for we know that if the good eye moves, the other one moves also.

In localizing, sometimes there is a source of error if we have an eye from which fluid has been lost. Frequently the question arises as to whether a foreign body is embedded in the iris or in the vitreous chamber. The question may come up as to whether it is embedded in the sclera, actually, or just outside. These questions we cannot answer positively, because we can be accurate only within one or two millimeters. I always feel that if the technic is correct and cooperation good, localization can be accomplished within two milimeters. That is all that can be expected, yet that two millimeters sometimes is a great item.

In one case where we first thought the foreign body was in the vitreous, on second examination we found it in the posterior chamber, and not only was it in the posterior chamber but it would move from side to side, being first on the nasal and then on the temporal side of the pupil. So you see there are sources of error in localizing foreign bodies even with as perfect a piece of mechanism as the Sweet localizer.

DR. ANCIL MARTIN. Phoenix, Ariz. (Closing): I personally, do not recall having seen a case in which a metallic foreign body passed into the globe, striking the sclera, rebounding and finally coming to rest in the vitreous; altho I can readily understand that such might be the case.

We frequently use protein medication in the treatment of foreign body injuries, usually with indifferent results, however; and also anti-tetanic serum is used when the possibility of tetanus threatens.

One of the cases here reported had two metallic foreign bodies in the injured eye. (V. Case 114).

We frequently hear confusing statements about the early x-ray in this country and the following dates may be of interest:

Roentgen discovered the x-ray, November 9, 1895.

The first radiographs made in this country were recorded by Professor Munsterberg of Harvard, January 31, 1896.

The first removal of a foreign body, following localization, was made by Dr. James Burry, February 11, 1896, when he extracted buck shot from some portion of the body.

The first recorded localization of a foreign body in the eye, was made by Dr. Francis H. Williams of Boston, June 5, 1896.

Sweet reported localization by his method November 27, 1898.

My case No. 7, of October 20, 1901, was my first attempt to localize a foreign body within the globe, a fluoroscope being used. Extraction was made by magnet by the posterior route. The eye was lost and enucleation ultimately done.

Incidentally, I will say that I brought the first Crookes' tube into Arizona, and with the assistance of an electrician, hooked it up to an old static machine. With it, we were able to see shadows of the bones of the hands and coins in a book, but it was of no service otherwise.

Shortly thereafter the static x-ray machine appeared in many offices, and it has gradually developed into one of the greatest instruments of precision we possess.

In hearing the discussion of my paper by Drs. Schuster, Jackson and other, I think you have listened to the "last word" on magnetic foreign bodies in the globe.

PROSTATIC OBSTRUCTION

K. D. LYNCH, M. D.
EL PASO, TEXAS

There is warrant for bringing this subject to the attention of the society once more, in view of the fact that we have reached approximately the possible low point in the mortality risk of the operations designed for its relief, and can begin to speak of its treatment as standardized, in relatively the same way as we may speak of the treatment of appendicitis as being standardized; i. e., in general there are well defined basic principles according to which the particular problems of the individual cases may be solved. Moreover, we wish to emphasize the fact that the present low mortality figures for operations undertaken to cure this condition are not an accomplishment of a few master surgeons and large organized clinics but are the prideful record of many trained urologists in every section of the country, and in our own Southwest in particular.

I do not purpose to weary you with a long statistical study, to compare the relative merits of this or that type of operative procedure, to weigh you down with this or that man's opinion on technical details. Rather I thought it would be of advantage to restate and summarize the actual facts that we who specialize in this branch of surgery have definitely agreed upon as basic prac-

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tice in the treatment of these cases, and to add here and there from my own experience the details which would round out the picture and possibly explain its salient points.

While our experience covers all types of obstruction at the vesical neck, it is intended that adenomatous hypertrophy of the prostate gland is meant when we speak of prostatic obstruction in this paper, unless some other type is specifically named. Briefly, the pathological change consists of a mass formed by a number of neoplasms, multiple adenomas, held together by fibrous tissue, the whole mass compressing the surrounding prostatic tissue outward; the compressed tissue with the true fibrous capsule of the prostate forming the so called "capsule" of the "hypertrophied prostate." A purist would then call us to task for speaking of prostatectomy when we mean the enucleation of this adenomatous mass from prostate tissue; but it is the customary term and no one will misunderstand or misinterpret its meaning.

There is good reason to believe that enlargement of the prostate, to some degree, is nearly universal after fifty years of age; at least it is safe to say that some degenerative change (glandular, fibrous, or carcinomatous) affects to some degree the prostate in the vast majority of men over that age. It has been estimated that about forty per cent have definite symptoms, but not all to a degree requiring radical treatment.

Now just what, precisely, is the importance of all this? The prostate is not an essential gland; its enlargement, per se, is not of any greater moment than, let us say, a small subperitoneal fibroid. Even difficulty in emptying the bladder, unless extreme, may be tolerated; but the fact is that vitally essential organs may soon be involved in the train of changes that result in the urinary system and the damage possible to these organs, the kidneys, can not be lightly disregarded. And the ultimate reason for the treatment of prostatic obstruction is based on the necessity, absolute and final, of protecting the functional capacity of the kidney.

The mechanism is fairly well understood; with progressive enlargement of the gland the bladder neck is encroached upon, the lumen of the internal meatus is narrowed and distorted, the resistance offered to the outflow of urine is increased. Cases vary considerably in their progressive dysfunction; in some the adenomas grow rapidly in size or the location of the enlargement is favorable for complete or almost complete obstruction of the lumen, (as in ball-valve cases), the bladder musculature compensates for a short time, or until the effort is useless; in others the adenomas increase slowly in size, the trigone hypertrophies, the bladder musculature gradually compensates, and even with definite symptoms of difficult urination for a very long time, there is no residual and no back pressure. In the former cases residual accumulates rapidly; in the latter slowly, and sometimes not at all, although the patient seeks relief on account of other symptoms, e. g., nocturia, frequency, urgency, pain, etc. In either case the bladder is gradually weakened from its increased activity, and back pressure in the kidneys inevitably results. Interference with kidney function means inefficient elimination of waste products and this toxemia affects all body tissues and functions in varying degrees; its final phase is definite uremia. In most cases infection is an added factor rather early, often coming spontaneously in the presence of stasis, as the kidneys try to eliminate bacteria absorbed from various foci in the body; at times it is due to the first instrumentation for relief of symptoms.

It is easily deducible from the above that any intelligent treatment should be given before structural changes have taken place, either in the bladder, resulting in loss of tone, sacculation (diffuse, or localized diverticula), diminished capacity or stubborn infiltrating inflammation; or in the kidney especially (hydronephrosis, pyonephrosis, permanent damage and chronic interstitial nephritis). Not knowing the cause we can not institute definite prophylactic rules; it would seem that avoidance of infections, sexual excesses or irregularities (withdrawal, etc.), proper exercise, care of the eliminative functions, general hygiene, would be indicated, especially to ward off the occurrence of the condition. But there are many cases with very slight symptoms, and in some it is possible to prevent the progress of the condition by observance of the above rules and by elimination of complications which may exist.

Leaving this question aside, we wish to emphasize especially the treatment of those cases with really well-defined symptoms and signs, but who have little or no residual. Residual seems to be a fetish that is blindly held as the criterion of our decision to operate. Naturally, once a fairly high residual is present, we can not afford to neglect the danger signal and our course is clear; but why wait until the damage has been done and it becomes a serious question as to whether or not the functional

capacity of the kidneys can be restored? Two cases will illustrate this point clearly.

Case 1. Mr. K., age 64. Symptoms for six years. On March 8, 1923, residual over 1400 c. c. Determined on gradual withdrawal and replacement method. Blood urea 0.96 grams per litre. Catheter a demeure and forced fluids; blood urea dropped to 0.72, then to 0.48 and finally to 0.24 grams per litre. Operation by suprapubic prostatectomy on April 10th; wound closed on twenty-second day; no residual.

Case 2. Mr. H., age 60, symptoms for three years. On October 16, 1921, residual 450 c. c. Trigone markedly elevated with large lateral pockets. Blood urea 0.96 grams per litre. This was reduced to 0.36 grams per litre and operation performed November 21, 1921. Under spinal anesthesia, a suprapubic prostatectomy was performed. After enucleation of the adenoma (and there was a very large subtrigonal mass), there was seen a deep transverse bar posterior to this still obstructing the internal meatus. This was divided by the cautery for two and a half inches. The patient always has some residual urine but no difficulty in urination. The lateral loculi are still present (two and half years later); residual four to six ounces.

In certain cases, due to inflammatory conditions, the bladder capacity is so diminished that there is little or no residual. Two examples:

Mr. D., age 60, with large prostate and two diverticula of the bladder. Has had several operations for abscesses in perineum and ischio-rectal fossae through which urine had been draining. Blood urea is 0.72 grams per litre. Bladder capacity only 200 c. c. with 50 c. c. residual.

Mr. I., age 67. Had residual of three ounces on April 7, 1922. When he returned on July 31, 1923, a large stone had formed in the bladder. Residual was one ounce. Large prostate was removed three months later at Mayo Clinic.

The cases with large residual, distressing difficulty in urination, chronic toxemia, need no expert to tell them that a "let alone policy" is not for them; they come for relief and demand it. They are the dangerous cases and are the mortality producers if not properly handled. What will be the management? There may be a few cases in which, on account of extreme age, cardiac trouble, or severe derangement of other vital function, it is advisable to institute "catheter treatment." It is conceivable that certain cases also, on account of location, lack of means and availability of skilled treatment, inherent prejudices or religious belief, might necessarily have to avail themselves of this method for relief although otherwise subjects for radical treatment. But, in general, it is a practice to be severely condemned, when proper surgical treatment is available. It was not such bad practice when the mortality for operative cases ran well over 30 per cent; but I repeat that it is inexcusable today when in all sections of the country the mortality in the hands of competent urologists averages two per cent. So, in general, we consider a case applying for relief as a probable operative case.

To eliminate other factors which might contraindicate operation the usual general physical examination is made. Where lesions exist in important organs such as heart, lungs or liver, we must know about them, even when not so serious as to contra-indicate operative methods, for our estimation of the patient as operative risk and also to guide us in choice of anesthetic. It is best to know if other conditions are present, too, e. g. cholecystitis, and to be able to evaluate its effect on some of the symptoms and thus forecast more accurately the extent of the relief obtainable. You will want to know if there are any evident signs of neuro-syphilis also, to guide you in your prognosis concerning the dysuria; a blood Wassermann, without having direct bearing on the trouble at issue, will help you to know what added stress may have to be reckoned with in carrying the patient through; the red cell count and hemoglobin estimation are important if you would know the exact condition of the patient's vitality. It is not the absolute amount of hemorrhage that may be important, but the amount of hemorrhage in relation to that particular patient's reserve. The only mortality in eighty-two cases was from a very moderate hemorrhage in a man 74 years old; well prepared, he seemed a good operative risk, with blood urea 0.36, but as little bleeding as ordinarily occurs in any case proved his undoing.

But naturally our attention will be concentrated on the urinary system. We want to know how that vital organ, the kidney, is working; we know that upon that factor depends the possibility of cure, and we are sure that it has suffered greater or less damage.

If distress is great and the need urgent it is allowable to drain off a small quantity of urine with the catheter. It is now universally agreed by urologists that sudden complete emptying of the bladder in cases with large residual is dangerous, whether it be accomplished by the catheter or by suprapubic drainage; and this, not because of the reason usually advanced, hemorrhage into the bladder, but because there results a sudden decompression of the kidneys as well, with resultant anuria, in many cases. It was this sudden decompression of the kidneys that was responsible for the former high death rate of prostatectomy; no preliminary treatment was employed and the operation removed the prostate, and the urine also, very suddenly. Formerly over

35 per cent of the operative deaths were due to uremia.

There are several well recognized methods of gradually emptying the chronically distended bladder. Zwalenburg's is especially good for the uremic cases; it effects gradual emptying against pressure. Intermittent catheterization with removal of small quantities each time, or an indwelling catheter with release of small amounts of urine at intervals, may also be recommended. Before deciding definitely which of them to use we arrange for a blood urea test (blood is taken before breakfast) to have a standard point from which to work. The bladder being gradually emptied, we employ an indwelling catheter, if possible, or intermittent catheterization two to four times a day, according to necessity; large quantities of fluid are insisted upon, five, six, or seven quarts a day; bowels are regulated; diet at first is low in proteids, then liberal. We prefer not to carry out the first stage by the suprapubic route, when drainage is necessary, and in no case is this drainage resorted to immediately unless catheterization is impossible, and even then a method is used so that gradual withdrawal of urine is possible. It is a well recognized fact that more cases die from cystotomy than die from prostatectomy. In one case after a period of catheterization it was necessary to do a cystotomy because the catheter was no longer tolerated on account of irritation of stones in the bladder. Following the cystotomy the urine output dropped to four ounces per day and we came close to having a mortality before operation on the prostate.

There is no question but that certain cases do not improve in kidney function sufficiently with catheter drainage, and cystotomy is necessary; also, when infection, stones, or difficult catheterization make it advisable. It has always seemed to me illogical to talk of two-stage operations as including only those in which a cystotomy has been done; it is just as much a two-stage operation when the preparatory treatment is made by catheterization. Personally I prefer to go through normal tissues when ready to do the enucleation, and it is easier to control hemorrhage directly, if necessary. Besides, at times a sinus may have a certain concealed infection present and when it gets a chance in normal tissues may cause severe reaction.

During this stage, I prefer to keep the patients up and around, going about their business, if residents, and taking moderate exercise; after three or four days, or a week, we make an estimation again of the blood urea and also of the urea of a twenty-four hour specimen. A cystoscopic examination is uusally made, if possible, about this time, to determine the size and character of the enlargement, the presence of stones or diverticula, character of bladder muscle, tonicity, etc. In general we find that a period of reaction sets in first; the specific gravity of the urine was high and falls very low; the urinary output increases rapidly but it is very much less concentrated; the patient gets restless, irritable, nervous, loses appetite. Gradually he begins to feel fine; food tastes good: he feels active, energetic. The above routine is continued until the blood urea gets to a normal or nearly normal level; some cases never get to the so-called normal, as they have other kidney derangement than that due to back pressure. I believe the main thing is a stabilization of many functional tests at a new level, after the reaction phases, even if it is somewhat above normal. In our early work we used the phenolphthalein test as the blood urea estimation was not then available. I consider it a reliable indicator in general or renal function, but believe the blood urea is even more dependable and must be used to help out in certain cases when a low phthalein output might seem to contraindicate operation. The normal finding is 0.24 grams per litre, and when this quantity is approximated and maintained for two or three tests at intervals, other factors being favorable, the case is ready for operation.

We do not hold any brief for any particular method of operation. It seems that the proper procedure for the surgeon is one with which he is thoroughly familiar. The old arguments about the merits of perineal and suprapubic operations no longer hold and the mortality figures, as well as the perfection of end-results, are so nearly equal that there should be no criticism of the advocates of one type by the advocates of the other. Personally I prefer the suprapubic operation, altho my few experiences with the perineal technic have resulted satisfactorily. I have seen very bad results from both types in the hands of men who did not really understand the general principles of prostate removal, or who were careless in removing all obstructing tissue. There have been eighty-two prostatectomies performed with two deaths;* one due to hemorrhage which we thought we had completely controlled.

The actual procedure in the suprapubic

*Since paper was read this number has increased to 108, with one additional mortality.

operation is well known to you all but there are several points which ought to be emphasized. Naturally it recommends itself that the bladder should be irrigated thoroughly and filled with clean fluid; but as all these bladders are infected we know that the sterile fluid injected for distention purposes is contaminated. So we employ suction apparatus (after exposing the bladder and making a stab wound high up in the anterior wall) to remove this fluid and keep it from flooding the perivesical tissue. We carry the incision right up to the apex of the bladder and at this point we place our drainage tube at the end of the operation; for it means quicker closure and more certain closure of our sinus. Careful inspection of the bladder is always made; small stones may have been overlooked in the cystoscopic examination, or diverticula may have been missed. In a recent case a very large diverticulum was discovered at operation, for the first time, by reason of a sudden gush of thick, foul smelling pus into the bladder after the distending fluid had been sucked out; the anesthetist thought we had opened into the gut. In this particular case I did the prostatectomy and let the diverticulum alone as it was very large and ran underneath the neck of the bladder. At a later operation I excluded it from the bladder, destroyed its lining membrane, and drained it as an abscess cavity, with a perfect result; it was too large and adherent to permit of dissection with any chance of the old man standing the operation.

The intraurethral method of Squier is the proper one to use for the enucleation, instead of Freyer's technic; it preserves very nicely the internal sphincter which, in a number of cases, was perfectly restored; also no harm is done the ejaculatory ducts and the sexual function is not injured.

I would stress, though, a careful, rather slow enucleation instead of the very rapid dramatic procedure, making all pressure toward the adenomatous mass and not toward the capsule. In this way the hemorrhage is usually very little and then mostly from the torn edge of the mucosa at the sphincter margin. If it does not stop quickly on pressure with gauze sponges held in the cavity, we usually use a Hagner bag or the Pilcher modification, taking care that the torn edges are tucked in toward the prostate space, that is, inverted. When the bag is used a regular Freyer tube is employed for the suprapubic drainage; in other cases a much smaller tube is used; in either case the bladder is sutured tightly around the tube. A cigarette drain is used to prevent any retention of infectious material in the space of Retzius and is brought out at the lower angle of the incision. We have been very fortunate in most cases, only one severe infection taking place in this area; the vast majority of the wounds have healed in practically their whole length by first intention, and the rapid substitution of a Pezzer catheter for the larger suprapubic drainage tube has made even the drainage hole inconspicuous. We have had only three post-operative hernias in the wounds, two of which are very small and cause no inconvenience; the third we repaired easily under local anesthesia.

The after treatment has been simple. Hypodermoclysis is always given when the patient is returned to his room, and plenty of fluids by mouth just as soon as they can be taken. The older men have been taken out of bed very promptly on the day after the operation; with the younger cases this has not been insisted upon so early. The drainage is usually out by the sixth day and replaced by a Pezzer catheter. Many wounds have been healed by the fourteenth day; the earliest closure was nine days, the longest delayed, forty-two days.

We have had four cases of alkaline incrusted cystitis and incrustation of the sinus, all in cases which had stones in the bladder at operation. One of these cases had considerable sloughing under the incrustation at the wound margins. All were successfully controlled by instillations of Bulgarian bacilli; we also gave urotropin and acid sodium phosphate tablets. One case returned three months later with a recurrence and to hasten the cure a large phosphatic stony deposit was removed from the sphincter edge with the cystoscopic rongeur.

It has been our custom in many cases to use an indwelling catheter per urethram inserted either at time of operation or when the Hagner bag was removed. The first case operated and so treated developed a severe epididymitis but this has been a complication only twice since, and then in cases where the indwelling catheter was not used.

Stones in the bladder, single or multiple, have been removed in sixteen cases. There have been ten cases with diverticula none of which contained stones. All have been resected except one mentioned above which was excluded from the bladder and drained in a secondary operation.

There have been two deaths in the series;* one from hemorrhage the day after operation. The bleeding was only slight and was thought to have been controlled but the blood loss was too much for that

particular patient's vitality. The other case would not be considered an operation death ordinarily as he had left the hospital entirely healed three weeks after the operation; secondary hemorrhage took place on the twenty-second day, following an automobile ride. This was slight at first but increased, and the patient was returned to the hospital for operation to control the bleeding. On the way to the operating room he had a convulsion, apparently due to a cerebral embolus; he died just as we opened the bladder, which contained no blood, and there was only a small clot in the prostatic space.

It is interesting to record that the youngest patient was forty-four years of age, had almost complete retention, and true adenomatous hypertrophy. The oldest was 82 years of age; (one case, 103 years old, was not operated) had four diverticula, a large stony mass around a piece of catheter broken off in the bladder, and a very large prostate.

The functional results have been excellent except in one case where a moderate residual persists on account of lateral sacculation of the bladder wall. We have had no permanent fistulae and no cases of even partial incontinence.

There have been no complaints about the effects on sexual powers. In no case has there been a loss or diminution of potency compared to the preoperative condition in this regard. Several cases have had a remarkable return of potency which had been interfered with by the enlarging adenoma. In most cases there has been no change noted, as many were beyond the period of sexual activity. Many have stated that the emission is so small in quantity as to be negligible; some claim this is due to the fact that the prostate fluid ordinarily constitutes the main mass of the emission and it is no longer excreted, as the ducts have been closed off and buried in granulation tissue.

These men are the most grateful patients we have. I have yet to hear of one who was dissatisfied in any particular with the results of his operation. The relief they have obtained, the improvement in general health and sense of well-being that has come to them, are things they do not forget; life to them is again worth living. We are asikng you all to put aside any prejudices you may have had on the subject, or any misunderstanding as to the benign nature of the operation. Too many men have been denied the benefits of this kind of surgery because of the mistaken impression that it was too risky an operation or at least too hazardous except in the hands of a few men in the large centers of population. That is no longer true any more than that good results with low mortality in gall-bladder surgery can be had only by famous surgeons. The general surgery done by numerous men here in the Southwest compares favorably with that done anywhere in the United States; and we can have the same thing said of prostate surgery, too, if we all work together to get the cases to operation before they are desperate risks, and in all cases employ these preparatory methods which have been shown to be the chief factors in reducing the mortality from prostatectomy.

ALLERGY AND IMMUNITY IN TUBERCULOUS INFECTION

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There are two distinct types of tissue reaction to bacterial invasion. The first and most common is the inflammatory or exudative type of reaction. This is seen in simple inflammation of any body tissue infected with any pus-forming organism. The reaction is prompt and decisive. It is caused by a sudden invasion of the infected parts by so-called wandering cells from the lymph and the blood. These white blood cells, wanderers by nature, already formed and waiting for just such an emergency, suddenly exude from the surrounding lymph spaces and blood vessels into the injured tissue. In addition, there are the well-known local and systemic signs of inflammation. There is practically no reaction on the part of the cells of the injured tissue itself, the so-called fixed tissue cells. Neither the connective tissue cells of the interstices or frame work of the injured organ nor its parenchymatous or specific tissue cells take any part in the defense at this time. The organ is dependent entirely on the moving or wandering cells from the lymph spaces and the blood vessels for its protection against this form of bacterial invasion.

The second type of tissue reaction is the proliferative or reproductive type. This is

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seen in its purest form in simple benign tumors such as fibroma and infective granuloma. It is in reality a foreign body reaction, the same reaction which the tissues make to any foreign body. It consists in a proliferation or reproduction or growth of the cells of the connective tissue of the infected organ. It comes on very gradually and proceeds very slowly. The wandering cells of the lymph and blood take no part in this reaction and there are no local nor systemic signs of inflammation.

A clear-cut, definite, distinct conception of the fundamental differences between these two types of tissue reaction is essential if one is to understand the pathology of tuberculosis. The one reaction—proliferative—is due to a reproduction of the connective tissue cells of the infected organ. It is slow and leisurely and is not accompanied by signs of systemic infection. The other reaction—exudative or inflammatory—is produced by an exuding of the white cells of the lymph and blood into the infected area. It is immediate and rapid in its action and promptly shows local and systemic signs of infection.

When a susceptible animal is infected with tubercle bacilli for the first time, the tissue reaction is at first almost entirely proliferative. There is an increase of connective tissue cells in the neighborhood of the bacilli. In a few days we find a typical tubercle in process of formation, composed almost entirely of young new-formed connective tissue cells. For the first week, scarcely any indication of inflammation or exudation is to be found. About the end of the second week, however, the picture begins to change. Leucocytes, especially lymphocytes, which up to this time have paid no attention to the infecting organisms, begin to develop a liking or positive chemotaxis for the tubercle bacillus and its products. By the end of the second week there are distinct signs of inflammatory changes about the periphery of the proliferated tissue which has formed around the tubercle bacilli. This changed reaction of the tissues after infection is what is known as allergy. Strange to say this changed or allergic reaction is not long confined to the tissues in the immediate vicinity of the infecting organisms. In a comparatively short time every tissue in the body has become allergic, and responds by immediate inflammation to infection with tubercle bacilli. The consequence is that reaction to secondary infection in a susceptible animal is inflammatory or allergic from the very beginning. Within six to twelve hours after a secondary infection, inflammation will begin to appear at the site of inoculation. Its intensity and extent will vary directly with the infecting dose. If the dose is massive, inflammation will be extreme and may lead to rapid necrosis and the casting off of a slough. In this way allergic tissue is prepared to make even heroic efforts to prevent successfully the spread of infection.

But allergy in tuberculosis does more than this. Not only does it limit the spread of the infecting bacilli by setting up an inflammatory reaction around them, but as Krause has pointed out, the secondary effect later is to "enhance and accelerate" the proliferative reaction inherent in the non-infected tissues. In other words, after the immediate inflammatory reaction has subsided, allergic tissues have a greater power of reproducing connective tissue elements than have non-infected tissues.

In a word, the primary tissue reaction to the tubercle bacillus is almost entirely proliferative. It is slow and leisurely and consists of a reproduction or growth of the connective tissue cells of the infected organ. After about a week the infected tissues begin to develop a changed reaction which is at first very largely exudative or inflammatory. This changed or allergic reaction soon spreads to every organ of the body and remains a permanent attribute of all body tissues, so long as tubercle persists in that animal. This inflammatory or exudative reaction is followed by an enhanced and accelerated proliferative reaction on the part of the allergic tissues.

What are the practical effects of these two forms of tissue reaction in causing the pathology of the disease we call tuberculosis? In the first place let us consider their effects on a primary infection in childhood. Since the body tissues are dependent principally on inflammation to limit the spread of infection, it is apparent that in primary infection with tubercle bacilli practically no means are at hand to limit adequately the spread of a massive infection. If the primary dosage is very small, its spread may be prevented by the slow growth of connective tissue cells around the bacilli and the formation of discrete tubercles. But if the primary infection is massive, it is allowed to run rampant through the body for the first seven days. Practically, the spread of infection during the first week is limited only by the size of the infecting dose and by the anatomy of the lymphatic system, through which the infecting organisms are borne towards the heart and lungs.

Primary infection in childhood may be

conveniently divided into three classes. In the first the infecting dose is small. After passing the portal of entry, the bacilli lie in the lymph-spaces of whatever tissue they infect. Then some of them are surrounded by newly formed connective tissue cells, and one or more tubercles are formed. Other bacilli are picked up by leucocytes and borne into lymphatic vessels. Soon they reach a lymph node where their progress is impeded, and the connective tissue cells of the lympth node react to form more tubercles. In this way all of the small number of bacilli in this primary dose are arrested and encapsulated by connective tissue in the neighborhood of the portal of entry. The number of infecting bacilli has been so small that even the slow proliferative reaction found in primary infection has been sufficient to prevent their spread. Not only so, but by the end of the first week the secondary, allergic exudative reaction begins, and soon is sufficient to prevent further spread of the infecting organisms. In addition, this allergic reaction soon extends to every other tissue in the body and subsequent infections are at once limited in their spread by the immediate inflammatory reaction of allergic tissue. The final consequence is that this child has received a vaccination against tuberculosis and has begun to develop an immunity which will be gradually increased and intensified by future infections. In the end he will acquire and maintain through continuing infections such a well developed immunity as will probably enable him to take care of any ordinary future infection with tubercle bacilli without developing manifest disease. To this class belong the large percentage of adults in civilized countries who have tuberculous infection but never develop tuberculous disease.

In the second class, the initial dose is considerably larger. It spreads through the lymph nodes of the neighborhood of the portal of entry, becomes so wide-spread as to reach the venous system by way of the thoracic duct. Passing through the heart and lungs, it finally extends to the tracheobronchial lymph-nodes at the roots of the lungs. Besides, the infection of few or many of the lymph nodes may have been so intense that the tubercles formed in them have become more or less caseous. These caseations are a constant menace to the future health of the individual. Undernourishment, intercurrent disease or overexertion may at any time cause a weakening of the fibrous envelope around these caseous nodes, bringing about a spread of the infection and consequent manifest disease. To this class belongs the percentage of the population of civilized countries who develop active manifest tuberculosis at some period in their lives.

To the third class belong those children who receive such large initial doses that the bacilli spread rapidly to all parts of the body, setting up an acute generalized tuberculosis which rapidly proves fatal. It has been said that primary tuberculosis which has passed beyond the limits of the lymph-gland system is invariably fatal.

From these facts it is evident that the question whether or not an individual will develop tuberculous disease is settled very largely in early childhood. This is equally true of the type of disease which will be developed. If an individual does not become infected in childhood, he has no specific immunity against the disease. If he then becomes infected in later life, as he is practically sure to do if he lives in a civilized country, he will most likely develop an acute generalized tuberculosis which will almost inevitably prove fatal in a short time. The same fate awaits him if he contracts a large massive infection in childhood.

If any individual acquires a moderate infection in childhood, his future history so far as tuberculosis is concerned depends on the seat of the infection and his environment. He may develop active disease and he may not.

The only really safe person is the one who has acquired a preventive vaccination in childhood by becoming infected with small doses of tubercle bacilli and so developing early an allergic reaction sufficient to lead to a lasting immunity.

What is true of individuals is equally true of communities and races. The most adequate protection which any community or race can have against the ravages of tuberculosis is a careful tuberculization in childhood. Such a vaccination, however, must be done with living bacilli. There is no immunity from tuberculosis without infection with living virulent tubercle bacilli. In the present state of our knowledge one does not feel justified in attempting artificial immunization of infants with living bacilli. For the present, the only feasible method seems to be to make every effort to avoid massive infection in childhood, by endeavoring to make the child's surroundings such that he will become very gradually vaccinated through natural channels.

Another very interesting question is the effect of allergy on the type and course of an already existing active tuberculosis. So far, we have referred principally to a high-

ly successful degree of allergy—one in which the inflammatory reaction is just enough to localize the infection and encourage subsequent fibrosis. Such a degree of allergy is the result of a small or very moderate infection. Let the infecting dose be massive, however, and the allergic or inflammatory reaction will be extreme and may lead to a rapid necrosis of the surrounding tissues.

This tendency to intense localized inflammation and necrosis is a characteristic effect of massive infection on a highly allergic soil in all stages of tuberculosis. So long as the number of bacilli liberated from any active focus of infection in any organ of the body is small, the inflammatory reaction will be rather slight. It will quickly be followed by an enhanced proliferative reaction, leading to the formation of a fibrous tissue envelope around the focus. But when a large number of bacilli are liberated an intense inflammatory reaction will result with probable necrosis of the surrounding tissues and extension of the disease.

Herein lies the pathologic difference between the two well recognized types of pulmonary tuberculosis—the proliferative and the exudative. In the proliferative type the infecting dose in any affected part of the lung is small, and tissue allergy is moderate in degree. The inflammatory reaction is slight or moderate and is soon followed by a growth of connective tissue which forms a fibrous envelope around the focus and the disease becomes arrested. In the exudative type, however, the dose of bacilli is large, and tissue allergy becomes intense. The inflammatory reaction is marked, leading to necrosis of the surrounding tissues and extension of the disease.

Clinically, one frequently sees these two types of pathology and all gradations between them, in one and the same lung. In one part of a lung will be found a purely proliferative process, leading to encapsulation of the lesion by firm fibrous tissue. In another part of the same lung one will find a markedly inflammatory reaction causing caseation and necrosis. Between the two, careful examination will disclose fibro-caseous and caseo-fibrous areas showing all conceivable combinations of proliferation and exudation. A proper appreciation of the significance of these two types of reaction is absolutely essential to the intelligent treatment of tuberculous disease.

Allergy is only one of several factors in immunity in tuberculosis, but it is a most important one. A careful study of its many manifestations will do much to aid in interpreting many of the symptoms and signs of clinical tuberculosis.

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DISCUSSION

DR. C. M. HENDRICKS, El Paso, Texas: As Dr. Flinn says, allergy is a changed reaction. That is to say a changed reaction on the part of the individual who has been re-infected with the original organism. The cutaneous reaction we see when a von Pirquet is used on a tuberculous individual proves the skin of that person allegeric and the reaction is produced by allergy. Therefore, we conclude that the person has already been infected with tubercle bacilli. This skin reaction or phenomenon does not occur in an individual who is not clinically infected. This allergy we speak of must begin to set up its machinery immediately following the initial infection, but we know little of it until experience with reinfection has brought it to our attention. From the standpoint of allergy, man is the most sensitive to tubercle bacilli infection. It is not possible to obtain a von Pirquet reaction in tuberculosis guinea pigs or rabbits. The state of allergy in man varies with the advance or recession of the disease. It is diminished by certain intercurrent diseases—measles for instance.

For many years much work has been done with immunity and this work has brought out certain facts. For instance, certain protective substances have been found in the blood that have to do with caring for infection and bringing about immunity or certain degrees of immunity. The substances are spoken of as bacteriotrophic and in the case of tuberculosis as tuberculotrophic. These substances can be measured with a fair degree of accuracy and it has been found that clinically normal individuals show more of these protective agencies than the ones infected. Whether that is the result of infection or whether these individuals who have tuberculosis would have presented a lower determination of protective substance is not known. Now from these facts it does not seem that the best way to protect an individual against infection is by infecting him. Pasteur always believed that ideal vaccinaton could only be accomplished by living bacteria. However, it has long since been shown that dead bacilli employed in vaccine are efficient, for instance as in typhoid. Immunity in the infected individual at best is only a relative thing. By becoming clinically infected by no means confers an immunity in tuberculosis. Immune bodies have been increased, but really immunity does not occur. Relapses are the most common thing in tuberculosis, which shows that there is an ebb and flow even in the relative immunity. There are so many influences brought to bear in these cases that affect the results no matter what the blood may present in immune bodies. Checked flow of lymph plays a definite part which retards the desired result; where lymph is stagnant, there immune bodies are much decreased as compared with the number of immune bodies if the blood is from the same patient.

We all know that in tuberculous peritonitis with effusion, the opening of the abdomen and removal of the fluid brings about excellent results. This is not due to the introduction of air, etc. as has been commonly thought. Improvement is brought about by relief of the flow of lymph. The peritoneal fluid of these cases present five to ten times less immune

bodies than the blood of the patient. By overcoming the stagnation, the flow of the lymph is then allowed to carry in from the blood many more immune bodies rather suddenly, and in many cases an almost spontaneous improvement is noted.

This is an extremely interesting subject.

No one knows where allergy or immunity begins, nor where they end. It may be that allergy will prove to be the whole mechanism of immunity.

DR. R. B. HOMAN, El Paso, Texas: I have greatly enjoyed Dr. Flinn's paper and think it is on one of the most important parts of the whole subject of tuberculosis.

I believe that in our extreme effort to find a rapid cure for tuberculosis, we do not give enough attention to the pathology and reaction which takes place in the system.

I am very glad the doctor has so ably brought forh his points. I have learned a great deal myself from his paper and thoroughly appreciate it.

DR. JAMES L. McKNIGHT, Tucson, Arizona: I wish to compliment Dr. Flinn upon the beautiful intent of his paper. I take a little comfort from his very accurate description of tissue reaction.

DR. JOHN W. FLINN, Prescott, Arizona, (Closing): I wish to thank Dr. Hendricks for going into the subjects so thoroughly. It is entirely a biochemical reaction, and what I tried to do was to point out what seems to me to be the important practical part of the allergic reaction.

I agree thoroughly with Dr. Homan that unless our clinical care and clinical treatment of tuberculosis can be based on a definite notion of pathology, we won't get very far in the treatment of this disease.

THE ELECTROCARDIOGRAM

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Almost all, if not all, biochemical processes are associated with, if not the actual cause of, change of electric potential or pressure which, when a closed circuit is formed, manifests itself by the passage of an electric current. It has long been known both that an electric current applied to a muscle will cause contraction and that a contracting muscle causes an electric current. A strip of muscle undergoing contraction from a stimulus applied at one end develops a muscular contraction wave which proceeds along the strip of muscle. Associated with this wave there is a change of electric potential so that the portion of the muscle undergoing contraction is negative electrically to the resting portion of the muscle and if these two portions of the muscle, namely, the contracting and resting portions, should be connected by a wire, a current of electricity would flow along the wire in an effort to equalize the electric potential of the two parts of the muscle. The heart is a body of muscle which in rapid sequence is showing contracting and resting periods and in its contracting periods manifests a progressing contraction wave which traverses the heart from the region of the sino-auricular node through the auricles, the auriculo-ventricular connecting tissue and into and through the ventricular neuro-muscular and muscular substance. As this muscle wave traverses the heart it is accompanied by changes in electric potential and by the use of the electrocardiograph these slight changes in electric potential can be recorded and studied. The heart in a sense is an electric magnet, in which the magnetic radiation appears and disappears in a rhythmical manner synchronous with the muscular contractions. Experimentally, this magnetic radiation, which again is the same as saying difference of electric potential, can be drawn off or made to manifest itself in the form of an electric current by joining two points of the heart by direct contact electrodes. The heart is in contact with the surrounding body tissues and it has been learned that differences of electric potential are not isolated in the heart but transmitted to the remotest portions of the body. In our every day life, particularly in this section of the country, we find that static electricity, produced by the friction of our shoes on the floor covering, is readily transformed into dynamic electricity or flow of current from any portion of our bodies that approaches close enough to another object which has a different electric potential. In fact the gratuitous exchange of electric sparks is almost a parlor pastime. It is in an analagous manner that by means of the electrocardiograph we are able to draw a current from any two portions of the body and to continue drawing a variable current corresponding to electro-motive changes associated with the cardiac contraction wave.

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I have attempted to explain the reasons why we are able to obtain an electrocardiographic tracing or electrocardiogram in every case in which there is a contracting heart. This tracing has aptly been called the heart's autograph. Now I have another technical explanation to make and that is why this cardiac autograph is taken by the electro-cardiographist three times, namely from lead I, lead II and lead III, and why these autographs vary so much. Electricity occupies space and like light it exerts its

Read before the El Paso County Medical Society, at El Paso, Texas.

influence in a realm of three dimensions. We know that a magnet held close beneath a piece of paper on which are sprinkled iron filings will cause these filings to arrange themselves according to the lines of force radiating from the magnet and that these lines will vary as the paper is moved but are absolutely dependent upon the position of the magnet. In a corresponding way, the differences of potential of different parts of the skin area vary because of differing relative positions from the cardiac magnet. A single tracing taken from one lead, as by having the skin electrodes connected from right forearm to left forearm gives only a one angle view as it were. By taking a tracing from a second lead, as right arm and left leg, we get a view from a second angle, and by taking a tracing from a third lead, as left arm and left leg, we get a still different view. We could go on and take tracings from any number of different leads but this has been found unnecessary as the added information gives so little beyond what is already obtained. Unfortunately there is no procedure to secure as it were a stereoscopic tracing which in one glance would cover all the dimensions in space as does a good stereoscopic x-ray or photograph.

Now to consider the heart's autograph we will first attend to those features which are similar in all leads. The string of the galvanometer placed vertically moves to the right or left on changes in current passing through it and by means of a strong light its shadow is projected onto a moving strip of light-sensitive photographic plate, film or paper which when developed gives a permanent record of changes of electric potential synchronous with each heart beat. It is found that the normal electrocardiogram shows movements of the string shadow in the form of waves which have been named arbitrarily P, Q, R, S, T, and U in sequence. The P wave corresponds with the auricular contraction while the QRS and T waves correspond with the ventricular contraction. All of these waves vary greatly in different tracings, some being above, some below and some on the neutral or isoelectric line, which line represents the portion of the string shadow when no current is flowing. The various leads show waves corresponding to one another in time but often very different in appearance. We have learned that the heart is really two muscular pumps in one. This is so and in consequence is producing two autographs at the same time, one for the right heart and one for the left. In life we can secure but one tracing, however, which is a composite picture of two sets of tracings; namely, that of the right and that of the left heart. Experimentally with animals, tracings have been made of the two sides of the heart separately and this has taught us the characteristics of the electrocardiogram of each heart. From this knowledge we have learned to distinguish over action of one side of the heart or the other, to determine the ventricle responsible for premature beats or extra systoles and to locate lesions interfering with conduction over the bundle of His and its main branches which lead to conditions known as branch bundle block.

The following is a summary of electrocardiographic diagnoses as made on patients that have been examined at Beaumont Hospital.

Total number of tracings reported	175
Number normal or essentially normal	61
Bradycardia (below 50 beats per minute)	3
Tachycardia (above 100 beats per min.)	21
Paroxysmal tachycardia	1
Sinus arrhythmia	7
Extrasystoles—auricular	4
—left ventricular	16
—right ventricular	11
Heart Block	7
Auricular Flutter	0
Auricular Fibrillation	11
Myocarditis	15
Left ventricular preponderance	34
Right ventricular preponderance	9

We will now consider the alterations of the tracings from normal which have led to some of these diagnoses.

First, there are alterations in heart rate. In our group where rate is slower than normal we have cases of acute catarrhal jaundice with rate below 50 per minute. The tracings here are perfectly normal in regard to regularity of the waves, appearance of the several components of the auricular and ventricular portions, and the time elements of these components. The only unusual feature is a prolongation of the period of diastole, thus showing that the slowing is not due to any difficulty in conduction within the heart after the contraction wave starts but in the mechanism which causes the sino-auricular node or pace maker to take up a slow rate.

In contrast to the cases of bradycardia just mentioned, we now give our attention to cases of tachycardia and most of our cases with this condition have been those of hyperthyroidism. Here again we find a normal electrocardiogram except for the period of diastole, which is unusually short.

Another condition where the rate may be perfectly regular but extremely rapid is

seen in cases of paroxysmal tachycardia. Here the diastole is so short that it often appears as a negative quantity; that is, the auricular wave occurs so early that it takes place prior to the completion of the previous contraction wave in the ventricles and is therefore superimposed on the ventricular wave. We have had a patient who during hospitalization had a number of attacks of paroxysmal tachycardia with a rate of about 180 and whose attacks were unusually long, two to three weeks. In this condition, there is not a gradual increase or decrease in heart rate, but the rate approximately doubles at the beginning of the attack or falls almost to half on completion of the attack in a sudden transition as is characteristic of the appearance of extra systoles.

Thus far we have given attention to those changes which are marked by alteration in rate. There is another group of abnormalities in which the chief alteration is in regularity of recurrence of the cardiac cycle; in other words, alteration of rhythm.

Sinus arrhythmia shows a normal sequence of the component parts of the waves representing each contraction, but with intervening periods of inactivity, the diastolic periods, of variable duration. The cardiac cycle is carried through normally after being initiated but the unusual feature is the failure of the pace-maker to initiate the contraction wave with normal regularity. This condition is usually a characteristic of youth, though often carried into adult life, and is made evident by respiratory changes, especially deep breathing, holding the breath, etc. This condition is generally considered of little or no consequence as it is compatible with good health and does not interfere with the physical activities of the individual.

Probably the most common group of arrhythmias is found where premature beats produce very small pulse waves or even no waves at all and consequently the occurrence is often erroneously spoken of as a condition of dropped beats. This is erroneous because the ventricle actually contracts even though no pulse wave can be detected in the arteries. Premature extra systoles may arise from any point in the cardiac musculature and hence we have them originating in the auricles, in the region of the auriculo-ventricular connecting bundle, in the right or in the left ventricle. The form of the tracing tells us the place of origin of these premature beats which occur usually earlier than the next expected heart contraction and render the heart incapable of responding when normally the next impulse is started by the pace-maker. This leads to a compensatory pause prior to the appearance of the next regularly recurring contraction.

In the extra-systole of auricular origin, the auricular wave differs in time or appearance or both from its usual time and form while the components of the ventricular portion continue with no change. In other words, the P wave differs while the QRS and T waves show no alteration. Should the impulse start in the neighborhood of the auriculo-ventricular node, the P or auricular wave may occur after the ventricular portion begins and be superimposed upon it while again the QRS and T portions of the ventricular waves are essentially unchanged.

Should the impulse begin in the right ventricle, there is no auricular or P wave and the tracing takes on the characteristics of right ventricular predominance, i. e., in lead II the QRS portion is upright and widened and the T portion is inverted and usually both portions show a much greater size of wave, or in other words the amplitude is greater.

Should the impulse arise in the left ventricle, here again the auricular portion or P wave is absent and the ventricular portion takes the characteristics of left ventricular preponderance, i. e., in lead II QRS is inverted and wide and the T wave is upright and the amplitude of both portions is great. There are possible variations in the appearance of the various extra-systole waves and atypical forms are often spoken of as "aberrant."

A third group of abnormal tracings, with or without marked changes in rate or in rhythm, are those dependent on conduction defects. It is this group which is very often indicative of gross myocardial changes. Heart block of one form or another is due to this defect of conduction. In its simplest form we have a normal rate and rhythm but a prolongation of the P-R interval. This prolongation may occur regularly with each heart beat or may vary in duration with successive beats. The auricular wave may be entirely blocked and not excite a ventricular contraction. It is possible to have many variations in the type of heart block. With a slow regular rhythm of pulse waves we may have two auricular beats to one ventricular contraction; this is known as a 2 to 1 block,—or we may have a 3 to 1 or 4 to 1 block, depending on the number of auricular beats prior to each ventricular beat. In some patients there is a complete block and in such condition the auricles contract regularly, and

at the same time the ventricles also contract regularly but with a very slow rhythm and entirely independently of the auricular contractions. When the pulse is irregular we may have dropped beats occurring with more or less regularity or with entire irregularity. In auricular fibrillation a similar ventricular irregularity is seen and in this case it is impossible for the ventricle to contract each time an impulse comes from the auricles as these impulses are usually occurring at the rate of six or seven per second, i. e., around 400 per minute. The block may occur within the ventricle beyond the division of the auriculoventricular bundle into its right and left branches. In case the right branch is damaged the characteristics of the left ventricular electrocardiogram are dominant while if delay of conduction is offered in the course of the left branch the tracing takes on the dominant characteristics of the right ventricular electrocardiogram. These conditions are spoken of as cases of branch bundle block.

Many hearts show a dominance of one or of the other ventricle and we are wont to describe a tracing which shows such changes as one of preponderance. If the electrocardiogram in lead I shows a well developed upright R with little or no S while in lead III it shows the reverse, namely an absent or poorly developed R with a well developed S, we speak of the condition as one of left ventricular predominance. If the reverse condition exists and the tracings show a dominance of the right ventricle with deep S in lead I and high R in lead III we speak of the condition as one of right ventricular preponderance.

Valvular defects in themselves do not alter the electro-cardiographic tracing. Study of the electrocardiogram permits us to note only such changes as come about from hypertrophy of cardiac musculature or from myocardial fatigue or degeneration resulting from overwork or toxemia.

I have attempted to present in a very concise manner the types of electrocardiograms which one sees in a hospital such as this, along with the distinctive features of these various types, with the hope that the simplicity of the subject may interest each physician to have at least a bowing acquaintance with this form of laboratory study.

In closing I should like to mention the following advantages that electrocardiographic study offers:

1. It gives an opportunity of making a permanent record of a series of heart contractions which permits of more accurate study at the time or even at the leisure of the examiner, than is possible from clinical notes. Records taken at different times can be compared and are of value in showing progress of cases.

2. Through electrocardiographic studies we become more familiar with different cardiac conditions and better able to label them properly when subsequently we use clinical methods alone. However, we do not wish to set aside this laboratory procedure even in cases that we can properly diagnose without it, as it gives great satisfaction to have a laboratory method which can give a definite confirmation to any diagnosis.

3. It is of value often in connection with the use of digitalis, where this drug is being pushed to the limit of the patient's tolerance, as it is the method giving earliest signs of beginning block, of arrhythmia, etc.

4. It also gives a clue as to prognosis in cases where the myocardium is affected.

5. It renders possible an accurate differentiation of the arrhythmias and the making of certain diagnoses which are impossible without its use.

THE TREATMENT OF HEMORRHAGE IN OBSTETRICS AND THE NEW BORN

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First, we will consider hemorrhage in obstetrics, as this condition is one of paramount importance to the physician who practices obstetrics, and one in which he should not only have the necessary materials at hand at all times, but should also have clear cut methods in his mind to meet these emergencies and be ready to apply them on short notice.

Only those methods that seem to offer the most direct means of bringing hemorrhage under control will be considered at length in this paper. Also a paper on this subject must of necessity mention the treatment of conditions which arise in obstetrics that cause hemorrhage but this paper will be limited to the treatment of the hemorrhage caused by such conditions.

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POST PARTUM HEMORRHAGE

Post partum hemorrhage confronts us most frequently and is usually a result of atony, lacerations of the birth canal, retained afterbirth material, or a combination of these conditions. The most successful treatment of post partum hemorrhage is prevention and this can be accomplished in the great majority of cases if the following precautions are observed: There should be no great haste in the delivery of the placenta unless severe hemorrhage is already present; the uterus should be carefully watched after delivery, using firm and diligent kneading when there is a tendency to relax and balloon up with signs of more than normal hemorrhage; the use of pituitrin and ergot, the latter after the placenta has been delivered. Operative deliveries should not be attempted until there is full dilatation of the cervix, or severe lacerations of the birth canal may result. With the observance of these precautions we will avoid hemorrhage in the larger percentage of cases. Occasionally we meet with frank hemorrhage even when the above precautions have been observed and when these procedures show signs of failure we had better determine as quickly as possible the cause of hemorrhage and then resort to some more effective treatment. In cases due to atony, if the placenta and membranes have not been delivered, they should be delivered immediately, manually if necessary, pituitrin and ergot given or repeated. After this some prefer a hot intra-uterine douche of saline. However, packing the uterus firmly with gauze, under the most aseptic precautions, is the surest method of treatment and should not be too long delayed.

If the hemorrhage is due to lacerations extending high up in the cervix this will often be stopped by the normal contractions of the uterus or packing the uterus. However, if it is determined that this is the source of hemorrhage, the laceration should be immediately sutured and just as quickly will the hemorrhage cease.

Retained materials causing hemorrhage should be removed manually, and if the auxiliary procedures already mentioned are not effective, the hot intra-uterine douche should be used or better the uterus should be packed with gauze. After the hemorrhage has been checked the usual supportive measures should be carried out, as the external application of heat, elevating the foot of the bed, water, salines, black coffee per rectum, or other stimulants as indicated.

PLACENTA PREVIA

In hemorrhage from a partial placenta previa, rupture of the membranes is all the treatment necessary in many of these cases. If this does not suffice, by the presenting part acting as a wedge against the bleeding area, then a hydrostatic bag should be inserted within the amniotic cavity, filled with sterile water and a light weight attached. The method of doing a version and bringing down a leg is not as satisfactory as the hydrostatic bag for the reason that it requires more dilatation of the cervix and it may increase shock which is already present. This procedure would only be considered under circumstances where a bag is not available. Packing the cervix and vagina should only be used as a temporary procedure or in conjunction with the above procedures. When packing is done it should be done under strict aseptic precautions and done very carefully or it will not accomplish what is intended and will only increase the chances of infection.

Hemorrhage from a centrally implanted placenta is usually one presenting a more grave situation than that of the partial type. The method selected in these cases will depend upon the softness and dilatation of the cervix, the parity of the patient, the duration of pregnancy, the amount of shock already present, and any procedures that have already been used which will increase the opportunity of infection. With these factors in mind the method selected may range from those already mentioned for cases of partial placenta previa to abdominal section.

ACCIDENTAL HEMORRHAGE

The treatment of these cases will depend upon the severity of the hemorrhage. In cases of a small separation they may be treated expectantly and may not be of serious significance. The application of a tight abdominal binder, morphine, rupture of the membranes, the insertion of a hydrostatic within the amniotic cavity, and vaginal packing, will suffice until the patient can be delivered by the method that seems most applicable.

In the more severe cases the method that empties the uterus the quickest with the least danger to the mother should be the method of choice. The procedures outlined for the less severe cases may be employed if the delivery can be completed within a reasonable time by version, forceps or craniotomy. When these procedures do not seem feasible for an early delivery and the condition of the mother permits, abdominal section should be the method

selected. This procedure also has another advantage, in a case where the hemorrhage has been severe and there is a heavy infiltration of the muscle tissue it is sometimes necessary to do a hysterectomy in order to control the hemorrhage after delivery, due to the failure of the muscles to contract. All supportive measures for shock and hemorrhage should be instituted before, during or after delivery as indicated.

HEMORRHAGE DUE TO RUPTURED ECTOPIC PREGNANCIES

The treatment of these cases is surgical. Operation should not be postponed in these cases with the hope that they will get better and then operate. Immediate operation gives the best results. On opening the abdominal cavity the spill of blood should be neglected and the hand immediately inserted, the bleeding part brought up and clamped. The operation can then be completed, using all the supportive measures necessary for shock and hemorrhage.

HEMORRHAGE FROM ABORTION

Hemorrhage from this source rarely requires further treatment than the use of pituitrin and ergot. Where this does not control the hemorrhage the uterus should be packed with gauze.

TREATMENT OF HEMORRHAGE IN THE NEW BORN

The treatment of hemorrhage in the new born is limited to two types principally. First, those having a hemorrhagic disease of the new born; second, those having hemorrhage due to birth injuries. The treatment of the first type of case depends upon some method that will increase the coagulation of the blood. For this purpose the injection of some of the animal serums or other products that can be readily obtained on the market for this purpose. The method that seems to give the best results is the subcutaneous injection of whole human blood. This may be given in ten to thirty c. c. doses and repeated at intervals of four to eight hours when necessary.

Hemorrhage as a result of birth injuries that demand treatment are usually intracranial, intraspinal or of the adrenals. In those of the brain and cord treatment by lumbar puncture and the withdrawal of blood or spinal fluid offers the most hope in the majority of cases. The puncture should be repeated if necessary. Surgical intervention has not given very satisfactory results in these cases, often perhaps because it is postponed too long and used only as a last resort. However, when surgical intervention is contemplated, it should not be postponed too long, and prophylactic injections of human blood should be used. The milder cases of this type often require no treatment and recover spontaneously and are very frequently undiagnosed.

Hemorrhage from the adrenals when of suffient amount to demand treatment should be treated surgically.

THE CAUSE AND CONTROL OF PULMONARY HEMORRHAGE

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Probably no accident occurring during the course of pulmonary tuberculosis is more alarming to the patient or his friends than is a hemorrhage from the lungs. Fortunately, however, it is rare for a hemorrhage to prove directly fatal, and the after effects are more to be dreaded than the bleeding itself.

From the standpoint of the physician the treatment of hemoptysis is rather unsatisfactory since we cannot see where the blood is coming from, and we are able to judge the effects of our treatment only by indirect means.

Most hemorrhages from the lungs are the result of tuberculosis, but they may come from the caseation of lung cancer, syphilis, actinomycosis, etc. They usually occur from a tear in the wall of a blood vessel, due either to the caseation process in the lung tissue attacking the wall of the vessel; to the thinning the vessel wall in a cavity, resulting in an aneurism and the rupturing of its wall; or to a tear in the wall of a vessel adjacent to old scar tissue where this tissue is suddenly torn loose from the normal tissue of the lung as the result of a strain, such as attempting to lift a heavy object, or a sudden movement of the arm in an unusual way, as in raising the arm for an extra heavy drive in golf, etc.

The treatment of pulmonary hemorrhage naturally differs somewhat, according to the type of patient with which one is dealing, his surroundings, the amount of involvement in the lung, and the amount of blood he has already lost, but there are three general principles of treatment which

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we usually apply, at least to a degree, in most all cases. These are:

1. Rest.
2. Measures to encourage coagulation of the blood.
3. Measures which reduce the blood pressure.

Rest is undoubtedly the most important step in treating this complication. The patient should be put to bed at the first appearance of blood in the sputum, and as near absolute rest as possible should be maintained until sufficient time has elapsed after the disappearance of all fresh blood from the sputum, to allow the tear in the blood vessel wall to heal, which is usually about a week. During this time the patient should not be turned in bed because of the the danger of dislodging the clot which has sealed the tear until it has had a chance to heal. Likewise free movements of the arms should be interdicted and coughing should be controlled as much as possible, even if it is necessary to resort to opiates for that purpose. Generally when a patient begins to expectorate blood, he becomes very much excited, and since this excitement aggravates the hemorrhage, it is often necessary to administer some opiate, usually hypodermically, at the outset of the treatment, but this should not be done where the hemorrhage is apparently pretty well under control when you see the patient, or if he is not excited. Where it is possible, the hemorrhage patient should be placed in the care of a special nurse and not allowed to get out of bed for any purpose or to attempt to wait on himself in any manner which calls for exertion. The bowels should be kept well open by the use of sulphate of magnesia or milk of magnesia, or by the use of enemas, so as to facilitate the use of the bed pan. For the control of cough, codein is preferable to the other opiates, because it is not so apt to produce untoward symptoms, such as nausea and constipation, or to get a hold on the patient which would encourage his becoming an addict; but morphine controls the cough and quiets the patient better and sometimes must be resorted to.

Where rest and the other ordinary measures do not control the hemorrhage, then resort should be had to artificial pneumothorax, which, by pressure, will usually control the hemorrhage at once. Contrary to the custom in the ordinary use of induced pneumothorax in treatment, it is usually advisable to give a large dose at once when it is used to control hemorrhage, since in this case it is used as an emergency treatment. The dose should be repeated with sufficient frequency to maintain the pressure necessary to control the bleeding. Often it is advisable to repeat the fillings every day for three or four times, at least.

The coagulation time of the blood of any individual can now be very easily and accurately determined, and this should be done with all patients who give a history of repeated pulmonary hemorrhages, and if the time is abnormally high, the administration of remedies which will bring it nearer to normal should be undertaken at frequent intervals as a preventive measure. We know that the two important elements which the blood must contain in sufficient quantities in order that coagulation may take place properly, are fibrinogen, or fibrin-ferment, and calcium. When the coagulation time is high it is usually because the blood is deficient in one of these elements, and in pulmonary hemorrhage, as in hemorrhage elsewhere, it is advisable to supply the deficiency, if possible.

Since it is rather difficult to determine which of the elements is lacking, it is a wise plan to administer both. The fibrinferment may be supplied to a fairly satisfactory degree, at least, by the administration of hemostatic serum. The preparations which we have used with apparently some degree of success, are those put out under the trade names of Hemoplastin and Thromboplastin. These two are for hypodermic administration in the tissues and not intravenously, since their local effect is to cause coagulation of the blood and this would likely prove disastrous if occurring in a vein. Recently, however, a preparation has been introduced under the trade name of Coagulen-Ciba, which is intended for intravenous use, with the assurance that it is not only not harmful in any way, but acts very quickly and effectively. Personally we have not yet been bold enough to try it, though we expect to do so at the first opportunity.

Transfusion of blood in pulmonary hemorrhage has also been resorted to, there being two possibilities from this procedure. First, the supplying of the elements needed to hasten coagulation directly and in a fresh state from blood which is more nearly normal, and second, to furnish a supply of blood to a patient who may be practically moribund because of severe hemorrhage. This may be necessary in extreme cases, but I think is rarely indicated.

Calcium may be and should be given intravenously in hemorrhage, and the preparations ordinarily used are the chloride or lactate in ten to twenty grain doses, once or twice a day.

In most patients with tuberculosis the blood pressure is below the normal for their age, rather than above, but in many cases the excitement incident to a hemorrhage brings about a temporary high blood pressure, and in some cases there is a strong bounding pulse which throws the blood with great force against the small tear in the blood vessel and thereby aggravates the hemorrhage. In either of these conditions we have gotten good results from the administration of preparations, the physiologic effect of which is to reduce the blood pressure. Among these are nitroglycerine, sodium nitrite and amylnitrite. For almost immediate effect, the inhalation of amylnitrite from a handkerchief on which an ordinary pearl has been broken is the best method, but its effect passes off very quickly. Sodium nitrite in doses of two grains repeated every two or three hours gives the most lasting effect of any of the nitrites. For the most satisfactory results in reducing blood pressure or controlling a bounding, rapid pulse, we have used Norwood's tincture of veratrum viride. This can be given with safety in from seven to ten minim doses, repeated every two hours, till results have been obtained, and then the doses put further apart.

Numerous other remedies and measures of all kinds have been suggested and used for the control of pulmonary hemorrhage, some of which are of some value, but, for lack of time, we have considered only the ones which have seemed the most valuable in our experience.

DIAGNOSIS OF SYPHILIS

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Syphilis is a systemic disease confined to the human race, although it is possible to infect some of the lower animals by artificial means. The disease may conveniently be divided into primary, secondary and tertiary stages, although there is more or less overlapping of these stages. As to the duration, the primary stage is usually considered about six weeks to three months; the secondary stage from two months to two years and the tertiary stage after the second year.

The primary manifestation of syphilis is the chancre. This is an ulcer, usually found in the genital region, but occasionally on the lips or elsewhere. It begins as a papule which soon ruptures and takes the form of an ulcer. When uncomplicated by chancroidal or other infection, it is small—an eighth to half inch in diameter—punched out and indurated. There is a slight serous exudate but pus means secondary infection. There is very little tenderness or pain, and it is this benign character of the lesion that often leads the patient to allow the condition to go untreated. Antiluetic treatment will hasten the disappearance of the ulcer, but under any other local treatment, or no treatment at all, the ulcer usually runs its course of three to six weeks. A large percentage of chancres are associated with other infection of the Ducrey type and no venereal ulcer should be allowed to pass as a chancroid until every possible effort has been made to find the treponema pallida. In other words, every venereal ulcer should be considered a potential syphilitic focus until proven, to the best of our ability, to be otherwise. This means repeated examinations for the organism.

Accompanying the chancre there is a regional enlargement of the lymph glands in one or both groins. This enlargement is not very marked and the glands are not tender as a rule, unless complicated by secondary infection.

The laboratory methods in this stage consist of the finding of the treponema pallida in the chancre or lymph glands, and occasionally the Wassermann may be of value in the latter part of this period. The finding of the treponema in the lesion is the **one indisputable diagnostic point**, and it behooves us to take full advantage of the opportunity to make a definite diagnosis. We must fully consider the fact that if we are able to cure syphilis at all, it is in this stage and the earlier after the infection the better are the chances of success. There are three ways of demonstrating the organism; by staining, dark field, and India ink. The first is difficult and time consuming; the second requires considerable paraphernalia; the third is simple, quick, efficient and requires only a bottle of black India ink and a microscope, plus the ability of the diagnostician to differentiate between the treponema pallida and other organisms that may be present. The Wasser-

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mann test does not usually become positive until the fourth to eighth week and so hardly applies to this stage. But in event the dark field is not successful, a Wassermann should be taken every week or so from the fourth to the twelfth week. And may I mention again, that this is the all important time to make a diagnosis and the healing of the chancre should not be considered, until every possible effort has been made to find the treponema.

The secondary manifestations of syphilis consist mainly of the skin eruption, but also may be mentioned fever, headache, joint and muscle pains, general adenopathy and anemia. The chancre has usually healed when secondary symptoms appear. The eruption may assume a variety of forms, from a macular eruption resembling measles to the virulent pustular eruption with large lesions distributed over the entire body—the eruption by which the disease obtained its name of "pox." The different skin eruptions are too numerous to describe in detail. Perhaps one of the most characteristic is the grouped papular eruption which, if itching is absent, may be said to be definitely syphilitic. Syphilitic eruptions are, as a rule, not accompanied by pruritus, but this of course does not hold in every case. Syphilitic eruptions have been described as "copper colored" with scars of the same color resulting. The latter may be of slight value, but as a whole is not sufficiently characteristic to be of any value in diagnosis. "Mucous patches" on the mucous membranes of the mouth, tongue and tonsils are frequent and are of considerable diagnostic importance. These are small, very shallow ulcerated areas, with a serous or slightly whitened surface, more distinct at the margins. On the tonsil, especially, often only the margin of the area is plainly noticeable. Flat, moist condylomata in the anal and genital regions are further characteristic skin lesions of syphilis and are most frequently seen in this stage.

Fever, as a rule, is very slight if present at all. Headache is a very characteristic symptom but may be absent in mild cases. With the exception of brain tumor, virulent smallpox and certain severe cases of meningitis, it is the most pronounced and persistent form of headache encountered in the whole field of medicine. This symptom, which in itself is not diagnostic of the disease, should always remind us to look for other signs of syphilis. Joint and muscle pains—general aching over the body—usually accompanies the secondary stage.

Lymph glands over the entire body are found to be enlarged; this varies from slight enlargement, to glands the size of pigeon's eggs, or larger. Iritis, of which the syphilitic is the most common form, is usually found in this stage. Anemia, often with icterus, occasionally is found.

In this stage of the disease the Wassermann test should be positive and is not to be neglected as a point in diagnosis, but of this I will speak later. Examination of the mucous patches and occasionally of some skin lesions, may reveal the treponema pallida but the chances of success are not many and a negative finding would mean nothing.

Next comes the tertiary stage and it is in this stage that we are most frequently called upon to make a diagnosis and it is here that we are probably most likely to fail. Symptoms may be entirely absent for years, at least sufficient to call the patient's attention to them, or may never appear. Furthermore, signs of the disease, as adenopathy or the Wassermann test, may be absent or at least not definite enough for a diagnosis. The patient does not report to us complaining of syphilis, or of symptoms characteristic of syphilis and frequently seeks to hide any history of the condition which you may seek to obtain. But we must always keep in mind that syphilis is a general disease and that its manifestations may simulate any known disease in the whole field of medicine. But on the other hand, we must remember that a syphilitic is prone to the same diseases as one not infected with the treponema pallida.

In this stage, as in the second stage, there is a general adenopathy. Enlarged inguinal glands, why I am not certain, and enlarged anterior cervical glands, because of tonsillar and dental infections, are of no value in diagnosis, but if not palpable, the negative finding is of some value. The posterior cervicals, providing there is no scalp infection, the epitrochlears and the axillaries are the glands that are to be palpated especially. Slight infections, as cuts and furuncles on the hands and forearms, may produce enlarged epitrochlear glands, and adenopathy of these glands, even if bilateral, does not necessarily mean syphilis, as was at one time taught. Furthermore, a general glandular enlargement may be tuberculous as well as syphilitic. The most characteristic finding is small glands, the size of buckshot or slightly smaller, in all the areas mentioned, often giving the sensation of feeling a chain of

beads under the skin, especially in the post-cervical region.

Of the eye lesions may be mentioned iritis, interstitial keratitis, retinitis and abnormal pupillary reflex. Iritis, in the majority of cases, is syphilitic and may be found in this as well as in the secondary stage of the disease. The irregular pupils which it usually leaves should always be looked for and considered of diagnostic value. Interstitial keratitis is a condition pathognomonic of syphilis but is usually found in the congenital cases. The findings in the eye grounds are of sufficient importance to warrant their routine examination. Syphilitic retinitis is rather characteristic and a papillitis is not uncommon, especially when the nervous system is involved, and may produce a dimness of vision as the first symptom noticed by the patient. Of the pupillary reactions, the Argyl-Robinson pupil is pathognomonic of syphilis and pupils fixed both to light and distance and poor light reaction may be considered suggestive.

In this stage, the nervous manifestations play an important part. Perhaps the most frequent is tabes or locomotor ataxia, the symptomatology of which I will not take up, but will call attention to the bladder symptoms which are often the first manifestations of the condition, appearing often long before there is any disturbance of the locomotion; these consist of a diminished bladder reflex which produces difficulty in starting the stream, with later retention and frequency. The cystoscopic picture is rather characteristic.

Certain affections of the cerebral nerves are characteristic of syphilis. Paralysis of the external rectus muscle is practically pathognomonic, and highly diagnostic signs are ptosis of the lid and other paralyses of the third nerve. Apoplexy, usually seen as a hemiplegia, in a person under fifty years is suggestive of syphilis, and under thirty-five years of age might be said always to be due to this disease, providing of course no trauma has occurred to the skull. Other conditions, as paresis, paraplegias, etc., are often suggestive of syphilis, but these conditions are in the field of the neurologist, where I am most ignorant. However, in our examination of a patient, especially if syphilis is suspected, a routine examination should be made of the common reflexes, as knee and ankle jerks, biceps, Rhomberg and pupillary.

There are various ulcerative skin lesions, more or less suggestive of syphilis, present in this stage, an important one being the large indolent ulcer of the legs. Varicose veins will, however, produce similar ulcers and should always be ruled out before syphilis is considered. Syphilitic alopecia is also a rather characteristic finding but at times cannot be differentiated from alopecia areata. Ulcerations of the tonsils and palate may occur; also of the nose, with persistant coryza, and occasionally perforation of the nasal septum. Scars of old secondaries, often copper colored, should be sought for.

The heart and arterial lesions of syphilis are rather characteristic, i. e., aortic regurgitation, aortitis and aneurism. Also may be mentioned the early hardening of the cerebral vessels which is responsible for the apoplexy previously mentioned. Primary aortic regurgitation, i. e., not due to dilatation of the heart, is practically always syphilitic. There is more or less accompanying aortitis which manifests itself as a systolic blow in the aortic area and transmitted upward, the aortitis frequently, if not always, preceding the regurgitation. Aneurism of the aorta is another lesion which is pathognomonic of syphilis and aneurisms anywhere, where trauma can be excluded, are usually syphilitic. The x-ray can here often make a diagnosis before physical signs of the aneurism are definite. The bone changes are numerous and are characterized by "destruction with hyperplasia" as can be demonstrated nicely by the x-ray. An arthritis, with bony enlargement around the joint is suggestive. The "saber shin" and irregular free border of the tibia are suggestive. Periosteal nodes, usually multiple, on the skull, accompanied as a rule by headache, are practically pathognomonic of syphilis.

Various digestive symptoms are found in this stage and may closely simulate gall-bladder disease, peptic ulcer or chronic appendicitis. This is aside from the gastric crises of tabes. They are often described by the patient as "indigestion." They clear up quickly under anti-syphilitic treatment and resort to treatment must at times be made to clear the diagnosis. Stricture of the rectum is a rare condition which is usually syphilitic.

Syphilis of the lungs, at least to the extent of a basal bronchitis is not very rare in my opinion. Pneumonic consolidation occasionally occurs in the congenital cases and very rarely in adults. Gumma of the liver is occasionally seen and the diagnosis can usually be made from physical examination. One of the most frequent causes of cirrhosis of the liver is syphilis, but the

diagnosis often awaits the autopsy table. Hepatitis occasionally occurs, often accompanied by jaundice.

A history of miscarriages, especially one in which recurrent pregnancies were carried longer and longer, perhaps with the last baby born dead or living only a short time, or a weakling, practically always means syphilis. Orchitis is occasionally produced by syphilis but this is usually a gonorrhoeal complication. The bladder picture has been mentioned when speaking of tabes. Syphilis may cause nephritis and can be differentiated only by its occurring in a syphilitic and clearing up under antisyphilitic treatment.

Congenital syphilis presents a number of findings all its own, i. e., dental hypoplasia, including Hutchinson's teeth, snuffles, sores on palms of hands and feet and around anus, microstoma with radiating lines, especially at the corners of the mouth, delayed closure of the fontanelles, saddle nose, keratitis and mental retardation. Another important sign is the bulging frontal eminences. The above points are all highly significant of luetic infection and if more than one is present an almost definite diagnosis of syphilis can be made on them alone.

The laboratory aids in the third stage consist of the blood Wassermann, spinal fluid examination and examination of gummatous tissue. Opportunity for the latter occurs only at operation and at autopsy; the microscopical examination is of value but the diagnosis usually rests on the site of the specimen and macroscopical appearance. There is considerable debate as to the advisability of spinal puncture, some men stating that it should be done early in every case to see if the nervous system is involved; others recommend that it should always be done before discontinuing active treatment; still others only make them when physical signs and symptoms suggest nervous system involvement; the latter I consider the best policy. Although I do not hesitate to do them to clarify my diagnosis, I do believe that they may produce a point of lowered resistance and so favor nervous system involvement when otherwise it might not occur.

The spinal fluid should be examined for the following five things; (1) pressure; (2) total leukocyte count and, if increased, a differential count; (3) globulin; (4) Wassermann; (5) colloidal gold curve. It should always be noted whether the fluid is clear and the specimen obtained should contain no blood. The pressure should be obtained with a spinal manometer, because, unless greatly increased, no information can be gained from the size of the stream. In the recumbent position and the patient relaxed, the normal pressure is usually below ten millimeters of mercury and anything above twenty can be considered to be definitely pathologic. The normal leukocyte count should be below ten cells per cubic millimeter. In some conditions, as certain cases of tabes, there may be only a slight increase—fifteen to fifty cells—or, as in syphilitic meningitis, the count may run to several thousand. The differential count usually shows a predominance of the mononuclears, over 70 percent, although in acute syphilitic meningitis the polynuclears may be relatively high. The Wassermann test requires from a tenth to two cubic centimeters of fluid and even then the reaction may be doubtful. However, weakly positive reactions here are rather suggestive, much more so than in the blood. The Lange colloidal gold test is perhaps not of so much value in determining syphilitic infection as in differentiating the various types, e. g., luetic curve and paretic curve. Of these tests, the first three are the most conclusive, although the Wassermann, if strongly positive, which is not the rule, is definitely diagnostic. All nervous lesions do not produce spinal fluid abnormalities. This is especially true of that due to sclerosis of the cerebral vessels and often of gumma of the brain.

The Wassermann test of the blood is undoubtedly the foremost laboratory test in our diagnosis, and if made properly and properly interpreted, is often the main finding that determines the diagnosis of syphilis. However, it is a very delicate reaction, requiring a high degree of perfection in reagents, and competent laboratory workers. These requirements are often not to be had and it is frequently found on sending portions of the same specimen of blood to several laboratories that radically different reports are returned. This, of course, breeds distrust in the test. True, the test is not specific, it does not have a specific antigen and other things may give a positive reaction besides syphilis, but if these are all weighed properly, the Wassermann test will be found to be of high diagnostic value. Let us consider these things one at a time.

It is not specific. Yaws, a tropical disease, caused by a spirochete will give a positive test; fever will at times give a positive test and when repeated after the fever is gone, will yield a negative reaction; constipation may give a positive test; jaundice at times gives confusing reactions. Tu-

berculosis may give a positive reaction although it will usually give a stronger reaction with tuberculous antigen.

It does not have a specific antigen; i. e., the substance used in the test to combine with the syphilitic antibody so as to fix complement, is not of syphilitic derivation —a point which differs from all other complement fixation tests. As you know, when the test was originated, extracts of syphilitic fetal liver and heart were used as antigen, but later it was found that any heart muscle, e. g. beef heart, which is usually used today, was just as efficient. Later, when the treponema pallida was discovered as the cause of the disease, an effort was made to use an extract of a pure culture, but was found not to produce the reaction.

As to the competency of the laboratory workers; this is of course important, as the test is one that requires knowledge, experience and technical ability.

With regard to the antigen used; there are mainly two classes of antigens, a simple alcoholic extract and cholesterinized or fortified antigens. A blood yielding a four plus reaction with the cholesterinized antigen might yield only a two plus or a one plus with the alcoholic extract antigen. This reaction might easily be caused by constipation, fever or tuberculosis. Nothing but a four plus with an alcoholic extract antigen, or its equivalent, can be considered as a real "positive" reaction, i. e. complete inhibition of hemolysis. Anything else is to be considered as suggestive, the stronger the reaction the more suggestive.

The method used, whether the original Wassermann technic or some modification, as the Noguchi, is important. All materials for the Noguchi test can, or at least could a few years ago, be obtained from the large biological supply houses. But during my internship, I had occasion to test this out thoroughly, hoping to obtain a test I could use in the office, and have proved to my entire satisfaction that the test is worthless when these bought reagents are used. Not only did I make the test myself but I had one of the leading doctors of Memphis, Tenn., who was using the test at that time, test for me some known positive and known negative bloods, which I had obtained from undoubted cases and these tests proved just as unreliable as those I had made myself. The Kolmer technic is a decided advancement as by it we can determine better just how positive a reaction we have and so have a better check on treatment.

The complement must always be fresh guinea pig serum, preferably pooled from several pigs. This must be titrated before making the test as the amount of complement varies slightly with different pigs. The sheep-cell amboceptor keeps well but should occasionally be titrated. The same may be said of the antigen. The patient's serum should be inactivated, as human serum contains complement of variable amounts. Furthermore, the quantities of all substances should be accurately measured and not, as is sometimes done, measured by drops.

The foregoing remarks will convince you of the minute accuracy required throughout the test; any variation may mean a worthless result, perhaps disastrous result, to the patient because the advice as to further treatment often hinges on this report.

Recently the flocculation test (Minicki, Sachs-Georgi, or Kahn test) has gained considerable favor and has been adopted by the U. S. Navy as standard, replacing the complement fixation test, and also by the Detroit Board of Health. It is much less complicated than the Wassermann and many users claim it is just as reliable. I have had no personal experience with it.

There are two other conditions which I wish to mention before closing;— parasyphilis and syphilophobia. By parasyphilis we mean those cases that still show a few signs which are found in syphilis but in which the infection appears to be cured or inactive, e. g. an Argyl-Robinson pupil with negative blood and spinal fluid. We do not know if these are, so to speak, syphilitic scars of a "burnt out" infection or a sign of a dormant syphilis which may light up at any minute. No definite rules can be stated in these cases but each must be considered by itself. Syphilophobia—fear of syphilis—is a troublesome condition. Some doctor has told a patient he has syphilis or he reads some of the voluminous literature distributed to the public or put in the newspapers and he is certain he has syphilis and from that same literature he is certain he must take treatment all his life. He often broods over his condition until he ends in the insane asylum, becomes a suicide or at least is worthless to his community. The treatment for syphilis is often as bad as the disease and something that should never be recommended unless the diagnosis is practically certain. Furthermore, the fact that the patient's condition may improve under anti-syphilitic treatment, often does not prove that the condition was syphilitic; it might have improved anyway, especially as probably some

local treatment was instituted also, and yet the patient will be branded as a syphilitic. Rarely will we be compelled to resort to a therapeutic test and it should never be done if possible to avoid it, for if the patient has syphilis, the treatment should be thorough, which is expensive, dangerous and time consuming, and if he has not syphilis, he certainly does not want the treatment.

In our diagnostic work we must remember that syphilis is no respector of persons and though more frequent in the lower classes, does not "pass up" the richest nor the most learned.

In conclusion a diagnosis of syphilis should never be made on **any one point** unless that point is **absolutely** pathognomonic, which can hardly be said of anything except the finding of the treponema pallida in the lesion. However, a judicious consideration of the history, symptoms, physical signs, and laboratory reports will practically always make a diagnosis possible. May I make this passing remark—a positive Wassermann, even if four plus, does not necessarily mean syphilis.

DISCUSSION

DR. I. L. GARRISON, Phoenix: In opening the discussion of these three phases of syphilis, I wish to state that I have read Dr. Purcell's very excellent paper, and will give it more attention than the other two subjects which have not been presented tonight.

1. There is a tendency in the medical profession to ignore clinical signs and symptoms, resulting in an actual decline in the sum total of present day knowledge of clinical syphilis.

2. The Wassermann test should be evaluated as only one of the many valuable points of evidence, always to be associated with all possible clinical findings, in leading to a diagnosis of syphilis. This test, when held infallible, is one of the most dangerous, far-reachng, and destructive of laboratory procedures.

3. In connection with Dr. Purcell's statement that frequently a positive Wassermann will be found in non-syphilitic conditions, we should say that old lesions, involvement of the tongue, legs, palms and soles, and many forms of nerve syphilis, frequently give negative Wassermann reactions which may become positive after more or less systematic treatment.

4. Specificity of infections; late investigations point to the probability of there being several specific strains of the spirochete, having special chemical affinities, the one for the skin, another the circulatory, another the nervous, another the osseous system, etc.

5. Persistent and pronounced headache of undiagnosed origin, is a definite syphilitic pointer.

6. Marked glandular enlargement, in a general way, is only negatively important.

7. The x-ray is very important in the early diagnosis of aneurism and bone changes.

8. History of recurrent pregnancies, with premature spontaneous delivery at different stages of gestation, is a definite syphilitic pointer.

9. Syphilis may simulate any other known disease, and the syphilitic, besides his syphilitic lesions, may have concurrently lesions of any other disease; this is especially true in skin lesions.

10. Coryza or snuffles is the most common characteristic of congenital syphilis; there may or may not be definite macular eruption; rhagades, purse string scars, skin infiltration, and cracking, bone gumma, and dental stigmata, are common in children.

11. Increased blood pressure in children, coming on at 8 to 10 years of age, with normal kidneys and cardiovascular system is a definite syphilitic pointer. In such cases look for undersize and under weight, and decreased hemoglobin.

12. The Wassermann in congenital syphilis is very elusive.

13. Prevention of congenital syphilis properly commences with the most distant progenitors. Every prospective mother, if she has not already, should have an eliminative diagnosis.

14. In concurrent diagnosis of syphilis and pregnancy, the patient should have the benefit of intensive treatment throughout the entire period, without any intermission; this treatment will most surely give a living and very often a non-syphilitic child.

The necessity for accuracy in the test and for competency in making the test goes without saying. The doctor has used a lot of words to express the idea that the clinician should utilize a laboratory regarding whose work he has PERSONAL knowledge. The testing of reagents and the other safeguards which competent laboratory workers follow, as a routine, is simply another way of saying that the clinical laboratory should know its business and exercise reasonable integrity in performing its work.

The most necessary point in this portion of the paper is that the clinician should form a liaison with laboratory regarding whose work he has PERSONAL knowledge, whose directors and technicians he can trust and upon whose reports he can de pend.

I do not believe that tuberculosis will give a positive Wassermann reaction to the degree which we consider diagnostic of syphilis,—so far as one manifestation can be diagnostic. I do not believe that fevers, or constipation or jaundice will give the positive reaction which we consider points to syphilis.

The Kahn flocculation test we run as controls on the Wassermann constantly in our laboratory. We check every doubtful Wassermann by the ice-box control method and all three or four plus positives by the Kolmer titration method.

If the laboratory takes its work seriously and performs and reports its results as consultations supplementing clinical examinations, and if the clinincian will deal with the laboratory as with a *consultant*, there will be no discrepancies to be explained away. It is not the *technic* that the doctor should worry about, but the integrity and ability of the men by whom and under whose supervision these laboratory procedures are conducted. If the laboratory is worthy to be used in its rightful capacity,—as a *consultant*, the technic can be left to the discretion of the laboratory clinicians; it is to their interest to make this test as accurate as is humanly possible, and they are infinitely more competent to do this than any clinician is.

THE DESERT SANATORIUM OF SOUTHERN ARIZONA, INC.

BERNARD LANGDON WYATT, M. D.
President Board of Directors
TUCSON, ARIZONA

Health seekers who read about the fascinating desert regions have little conception of the problems to be solved in the establishment of facilities for their care and comfort. And this is particularly true when provision must be made for heliotherapy at all seasons of the year and under constantly varying atmospheric conditions.

This paper will deal with some of the problems that I have had to consider in connection with the construction of the Desert Sanatorium and the special architectural features that have been adopted in an attempt to solve them.

The choice of the location and site involved not only the usual considerations relative to accessibility, topographical features, transportation facilities, orientation, soil and drainage, water and power supply, etc.; but also that very important factor in desert regions, known as cold air drainage. A few hours after sun down in the summertime, currents of cold air from the nearby mountain ranges descend into the river beds and overflow onto the surrounding plain, with the result that the night temperatures within this belt are from 10° F to 15° F lower than would otherwise obtain.

For the various buildings, the Hopi style of architecture was adopted because of its appropriateness—the uneven outlines harmonizing with the sky-line of the surrounding mountain ranges and the scenic ruins of historic Fort Lowell to the north.

The special architectural features of the main building were the natural and more or less obvious result of making the comfort of the patients at all times, and particularly during the summer months, the primary consideration.

All of the patients' rooms and porches were orientated to face the east and the building was so designed that the rays of the sun cannot fall upon the outside walls of any patient's room.

The main veranda is a combination of masonry and wood. Hand hewn square posts with Indian-Spanish bolsters support rough hewn beams and the veranda space will be subdivided by adjustable curtains.

The attic will contain a dead air space and between the ceiling joists there will be a layer of insulating material which, in hot weather, will effect a reduction of from 15° F to 20° F in the temperature of the rooms beneath.

Thermostatically-controlled, oil burning, hot air furnaces will be installed, and in the summer time the ducts of the heating system will be utilized for conveying throughout the building air that has been cooled by washing.

Every patient's room has a porch and opens into a completely equipped bathroom. On each floor there are private suites consisting of a living room, dressing room, bath room and porch.

Two features of the Desert Sanatorium will be unique and do not exist in any other institution—

The first is a short wave length variometer by means of which variations in the intensity of radiations of short wave length may be accurately measured and the patient's dose of ultra violet rays determined with precision in terms of Angstrom units; the second is a special heliotherapy installation on the roof with an area of twenty-five hundred square feet that will be entirely enclosed with quartz glass.

It is believed that solar radiations of a wave length shorter than 295 millimicrons do not reach the earth and there is much evidence to indicate that rays with a wave length of from 297 to about 330 millimicrons are those of the greatest value and importance in the treatment of disease. It is, of course, possible that there is virtue in the solar spectrum considered as a whole and that the power of the specific ultra violet radiations may be intensified by the reciprocal action of some of the longer waves.

On the other hand Hess has shown that the visible waves may exert a counteracting force on the action of the ultra violet rays, so that when visible and invisible radiations impinge at the same time on the skin, the power of the ultra violet rays is somewhat lessened.

The important consideration, however, from the standpoint of the present discussion is that the Desert Sanatorium will be equipped with the means of quantitive as well as qualitative analysis of the solar spectrum and its results will therefore rest upon a sound scientific foundation.

Read Before Sectional Meeting of the American College of Surgeons, Tucson, Arizona, February 2, 1926.

Southwestern Medicine

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Arizona State Medical Association Program

Thirty Fifth Annual Meeting, April 26 to 28, 1926

Globe, Arizona

HEADQUARTERS DOMINION HOTEL

The completed program for the Thirty-fifth Annual Session of the Arizona State Medical Association is given below. It reflects great credit on the Chairman of the Program Committee, Dr. Wm. B. Watts, Jr., of Miami. It is a well balanced program of topics of every-day interest, with just sufficient special material to add variety and spice.

Among the things to be considered by the House of Delegates will be the proposed new constitution, which will be presented for discussion and, if the delegates so decide, for adoption in time for the election of officers to follow the new rules. All county societies in the state have been furnished copies of the proposed constitution for their delegates, and it is expected that they will be prepared to discuss the new provisions, amend them as desired, and adopt the new constitution at this meeting.

GENERAL PROGRAM

MONDAY, APRIL 26, 1926

MORNING SESSION

10:00—Call to order:
DR. R. D. KENNEDY, GLOBE
President.
Invocation:
REV. J. K. HOWARD, GLOBE.

10:10—Address of Welcome:
JUDGE CLIFFORD C. FAIRES, GLOBE
Response:
DR. A. M. TUTHILL, PHOENIX.

10:25—Introduction of President-Elect:
DR. GEORGE A. BRIDGE, BISBEE.
President's Annual Address:
DR. GEORGE A. BRIDGE, BISBEE.

SCIENTIFIC SESSION

10.40—*Granuloma Inguinale.*
DR. H. M. PURCELL, PHOENIX.
Discussion:
DR. N. D. BRAYTON, MIAMI.

11:20—*The Present Status of the Wassermann Reaction.*
DR. P. B. NEWCOMB, TUCSON.
Discussion:
DR. H. L. GOSS, PHOENIX.

AFTERNOON SESSION

1:30—House of Delegates.
Discussion of the proposed new Constitution and By-Laws.

2:30—*Iron Therapy, New Light on an Old Subject.*
DR. GEORGE DOCK, PASADENA, CAL.
Discussion:
DR. ORVILLE H. BROWN, PHOENIX.

3:10—*Tularemia.*
DR. ANCIL MARTIN, PHOENIX.

3:40—*Manifestations of Syphilis in Skin and Mucous Mebrane.*
DR. T. T. CLOHESSY, PHOENIX.
Discussion:
DR. CLARENCE GUNTER, GLOBE.

EVENING SESSION

7:30—Smoker:
COBRE VALLE COUNTRY CLUB.

TUESDAY, APRIL 27, 1926

MORNING SESSION

9:00—Council Meeting.

10:00—*Ethylene Anesthesia.*
DR. HARRY R. CARSON, PHOENIX.
Discussion:
DR. W. V. WHITMORE, TUCSON.

10:40—*Blood Transfusion.*
DR. VICTOR M. GORE, TUCSON.
Discussion:
DR. GEO. E. GOODRICH, PHOENIX.

PANORAMIC VIEW OF DOMINION COPPER CO'S WORKINGS, GLOBE

11:20—*Intestinal Ostruction; Case Reports.*
DR. HAL W. RICE, MORENCI.
Discussion:
DR. W. A. HOLT, GLOBE.

AFTERNOON SESSION

1:30—House of Delegates.

SYMPOSIUM ON UROLOGY

2:15—*The Recognition and Treatment of Urinary Infection.*
DR. WM. F. BRAASH, Section of Urology, Mayo Clinic.

2:15—*Ureteral Calculi.*
DR. W. G. SCHULTZ, TUCSON.

3:15—*Nephroptosis.*
DR. CHARLES S. VIVIAN, PHOENIX.
Discussion:
DR. E. W. ADAMSON, DOUGLAS.
DR. C. A. THOMAS, TUCSON.

4:00—*Radiant Energy in Accessible Malignancy of the Head and Face.*
DR. W. WARNER WATKINS, PHOENIX.
Discussion:
DR. JOEL I. BUTLER, TUCSON.

EVENING EESSION

7:30—Annual Banquet and Dance.
Toastmaster:
DR. JOHN E. BACON, MIAMI.

WEDNESDAY, APRIL 28, 1926

MORNING SESSION

9:00—Council Meeting.

9:30—*Contraceptive Technique.*
DR. JAMES F. COOPER, Medical Director, Research Department, American Birth Control League.

SYMPOSIUM ON TUBERCULOSIS

10:15—*The Influence of Focal Infection in Relation to Tuberculosis.*
DR. CHARLES C. BROWNING, LOS ANGELES.

10:45—*The Pathology of Bone and Joint Tuberculosis.*
DR. JOHN W. FLINN, PRESCOTT.

11:05—*Treatment of Pulmonary Hemorrhage.*
DR. VICTOR RANDOLPH, PHOENIX.
Discussion:
DR. S. H. WATSON, TUCSON.
DR. F. F. MILLER, MIAMI.
DR. WILLARD SMITH, PHOENIX.

AFTERNOON SESSION

2:00—*The Public's Interest.*
DR. WILLIAM O. SWEEK, PHOENIX.

2:40—Business Session.
General Assembly and House of Delegates.
Election of Officers.

SOCIAL EVENTS

Entertainment must, of necessity, depend upon final detailed arrangements, but a partial list of the social events has been arranged:

Ladies' Auxiliary luncheon, bridge and golf at Cobre Valley Country Club, Monday, April 26, 1926. Evening, informal reception and musical at the Almaden Club.

Tuesday, April 27, golf trips to various points of interest, and lunch.

Monday evening, April 26, smoker at Cobre Valle Country Club.

Tuesday evening, April 27, annual banquet and dance at the Cobre Valle Country Club.

PANORAMIC VIEW OF MIAMI

ANNOUNCEMENTS

Sessions of the ARIZONA STATE MEDICAL ASSOCIATION will be held in the Elks Club.

No address or paper before the Association, except those of the president, orators and invited guests, shall occupy more than twenty minutes. Those opening discussions shall be limited to five minutes, those who

follow three minutes, and no one shall speak more than once on the same subject.

Papers when read shall become the property of the Association and shall be handed to the secretary to be published in SOUTHWESTERN MEDICINE.

Hotel reservations or any information concerning the meeting or entertainment may be had by communicating with members of the COMMITTEE ON ARRANGEMENTS:

W. B. WATTS, JR., Miami, Arizona.
CLARENCE GUNTER, Globe, Arizona.
C. E. IRVIN, Miami, Arizona.

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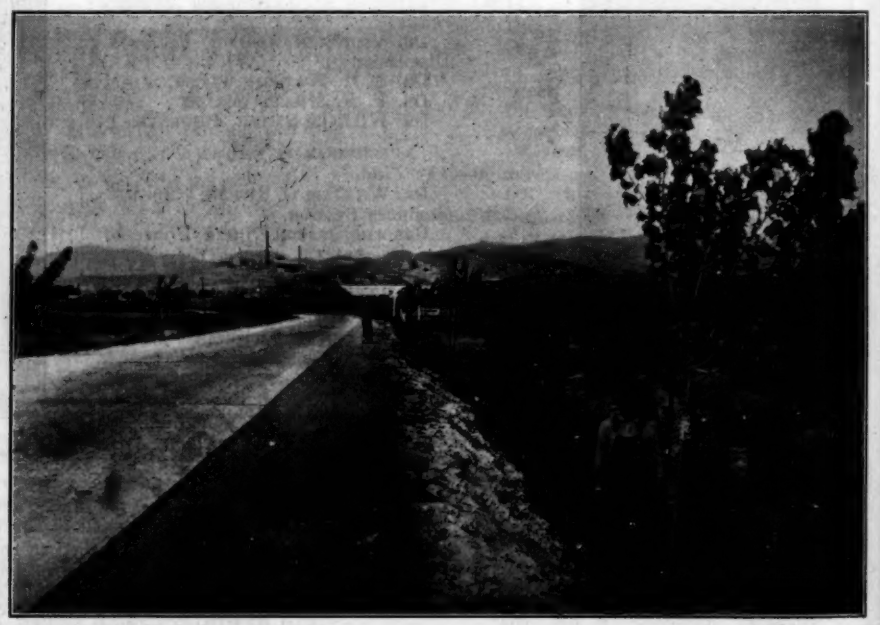
GILA COUNTY AGAIN

There are men in Arizona who can remember medical meetings in Globe prior to 1913, but that was the year the editor first attended an Association meeting there, driving over the Apache Trail in his first auto, which he had owned but a week. The Association wandered afar for several years and finally came home to Globe again in 1919. It has again staid away as long as it possibly can and all eyes are now turned toward Gila County for the meeting there April 26 to 28.

From every part of the state an excellent graded highway leads into Globe, and it is safe to believe that the dust will never get settled on any of these roads during the day of April 25th, when the clans are gathering.

An excellently illustrated booklet, describing the scenic features of Gila County, has been sent to every doctor in Arizona. Very little can be added to this pamphlet, and it is hardly necessary to speak of the well known scenic attractions of this "Heart of Arizona's Wonderland." If you have not made a trip through one of the great concentrators in Miami, or through the great International smelter, these are well worth an hour or two of your time, and the privileges will be open to the guests of the Association at this meeting.

Golf on the sporty Cobre Valley Country Club course, near Miami, will be an attraction for those who wish to arise early and



A CONCRETE HIGHWAY CONNECTS GLOBE AND MIAMI

play nine holes before the morning sessions open.

The beautiful hospitals of Miami and Globe will be open for those who desire to see how industrial injuries are handled. It will be an eye-opener for many of those who have not come in contact with this class of work.

The hospitality of the Gila County Medical Society and their Ladies' Auxiliary is famous. It would be painting the lily to attempt to discourse on this. Those who come will have many pleasant surprises in store for them; those who do not come can read about it next month,—and weep!

THE NEW MEXICO STATE MEETING

The Forty-fourth Annual Meeting of the New Mexico Medical Society will be held in Albuquerque on May 19, 20 and 21.

Dr. L. B. Cohenour, Secretary of the Bernalillo County Medical Society, has the program well under way, and full details will be given in our May issue, which will be in the mails early in the month, in order to bring full information to our readers well in advance of the meeting.

The partial list of papers, not yet arranged as to dates and not yet complete, are as follows:

"Operative Technic in Gall Bladder Surgery," Dr. H. A. Miller, Clovis, N. M.

"Milk Sickness, Erroneously Called Alkali Poisoning," Dr. M. B. Culpepper, Carlsbad, N. M.

"Medical Aspects of Crime," Dr. Karl Meninger, Topeka, Kans.

"Radium Therapy" (lantern slides), Dr. A. R. Hatcher, Wellington, Kans.

"Case Report of Ante-Partum Eclampsia," Dr. U. Pollack, Fort Bayard, N. M.

"X-ray Examination of the Gall Bladder," Dr. W. Warner Watkins, Phoenix, Ariz.

"Gall Bladder Disease," Dr. Frank J. Milloy, Phoenix, Ariz.

"Extrapleural Thoracoplasty in Pulmonary Tuberculosis," Dr. W. H. Thearle, Fitzsimmons Hospital, Denver, Colo.

"Heliotherapy," Dr. Samuel H. Watson, Tucson, Ariz.

"Immunity," Dr. Charles F. Beeson, Roswell, N. M. (Presidential Address).

Subject not announced, Dr. J. W. Hannett, Gallup, N. M.

ABANDONMENT OF OUR SPANISH ABSTRACT FEATURE

Two issues of SOUTHWESTERN MEDICINE, containing abstracts in Spanish of

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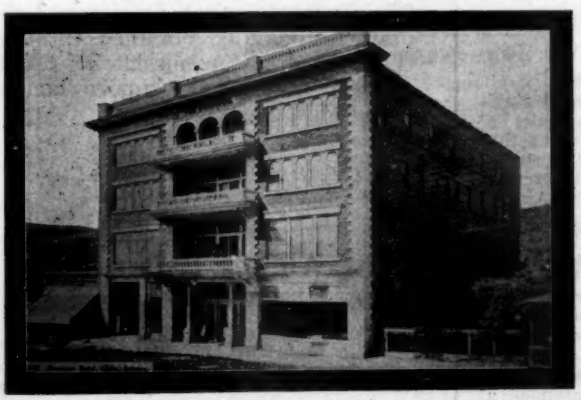

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A. HANSEN, Mgr.

Globe Arizona

the original articles, have been sent to all Spanish speaking doctors in the northern states of old Mexico. Letters have accompanied these journals, asking their cooperation and an expression of their sentiments toward this venture. The response to this has been so slight, that it is thought bet to abandon the venture for the present, at least.

The journal will, from time to time, publish abstracts in Spanish and original articles in Spanish, when they are of special interest, for the benefit of those Spanish speaking doctors who are members of the Medical and Surgical Association of the Southwest, or who are subscribers to the journal, but the practice of summarizing all articles will be discontinued until there is a greater demand for this service.

SUSPENSION DE NUESTROS ABSTRACTOS ESPAÑOLES.

Se han mandado dos ediciones del SOUTHWESTERN MEDICINE, conteniendo abstractos en español de los articulos originales, a todos los médicos de habla española de los Estados del Norte de la Republica de México. A esos journals se han acompañado cartas pidiendo la cooperacion y la expresion del sentir hacia esta ventura. A esto se ha respondido con tal desaire, que meior se ha pensado abandonar por ahora esta tentativa.

Sinembargo, el journal publicará de tiempo en tiempo, abstractos y articulos en español, cuonda sean de especial interes a los médicos de habla española subscriptores del journal y miembros de la Asociacion Medico-Quirurgica del Sudoeste; pero el servicio de sumarizar en español todos los articulos originales, quedara descontinuado hasta que haya mas demanda por esta practica.

SANTA FE COUNTY (N. M.) NEWS

College of Surgeons Inspector Visits

Eight members of the medical and surgical staff of St. Vincent Sanatorium were the guests at a luncheon served by the Sisters of Charity at the Sanatorium, Thursday, February 18. The physicians had been invited to meet Dr. J B. Tyrrell, of the Hospital Standardization Staff of the American College of Surgeons, with headquarters at Chicago. Dr. Tyrrell was on one of the periodical inspection trips, visiting hospitals in the southwest.

Dinner to Cancer Control Physician

Ten members of the Santa Fe County Medical Society, two local dentists, Dr. J. B Tyrrell of the American College of Surgeons, Dr. Grover Kempf of the U. S. P. H S., Dr. Sarah L. Norton of Columbus, Ohio, and special correspondent Brian Boru Dunne of the Santa Fe "New Mexican" attended a noon luncheon at La Fonda, February 19, in honor of Dr. William F. Wild, of the American Society

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Plant	Time of Bloom (Hay-Fever Season)	
Cottonwood (Populus macdougali)	Feb	April
Shad Scale (Atriplex canescens)	March	June
Rabbit Bush (Franseria deltoidea)	April	May
June Grass (Blue Grass, Poa pratensis)	May	Sept.
Bermuda Grass (Capriola dactylon)	May	Sept.
Johnson Grass (Sorghum halepense)	June	Oct.
Annual Saltbush (Atriplex Wrightii)	July	Sept.
Redroot Pigweed (Amaranthus retroflexus)	July	Sept.
Sage Brush (Artemisia tridentata)	July	Sept.
Cocklebur (Xanthium canadense)	July	Sept.
Russian Thistle (Salsola pestifer)	July	Sept.
Careless Weed (Amaranthus palmeri)	July	Oct.
Slender Ragwood (Franseria tenuifolia)	Sept.	Oct.

PROCEDURE

FIRST, determine when the patient suffers an attack and apply skin tests with pollens of plants causing Hay-Fever at that period.

SECOND, from the resulting reactions determine the antigen that should be used for desensitizing. Several skin tests may be made at one time. Positive tests resulting from plants that pollinate at periods when the patient does not suffer may be entirely disregarded, as the patient is able, without aid, to overcome this sensitiveness.

TREATMENT

Where several reactions of equal intensity are recorded the use of the **Individual Antigen** is recommended for persons whose hay-fever symptoms occur from the latter part of April to the first of August and **Ragweed Combined Antigen** is recommended for persons whose hay-fever symptoms occur from August first to frost in October.

Diagnostic Assortment No 5 ..... **Gratis**

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PATHOLOGICAL LABORATORY

PHOENIX, ARIZONA.

for the Control of Cancer. Dr. Wild arrived in Santa Fe the previous night and that evening addressed a gathering at St. Vincent Sanatorium, principally composed of nurses. After the luncheon next day he gave a brief talk to the physicians and guests.

Dr. Wild emphasized the apparent biologic fallacies of the germ theory of cancer dissemination, as well as the public dangers arising from continual exploitation of this theory. People are prone to put undue faith in cancer serums; these serums are not only taken up by quack practitioners, but irreparable harm comes to cases which defer surgical interference to await results from serum administration. As yet the germ theory has not been satisfactorily demonstrated to be an actual cause of cancer.

The lead treatment of Blair and Bell of Liverpool is still in an experimental stage, and the drug itself has not yet been rendered stable. Varying improvement in some 50 of about 250 cases treated would indicate that this treatment may have a genuine value; but it must be used with great care in order to avoid toxic manifestations, and nephritis is a contraindication to its employment. So far treatment by this method has been possible only in Liverpool, as the lead preparation used will remain stable but 24 hours.

The general increase in the number of cases of cancer occurring throughout the world is probably very slight. Switzerland leads in the relative number of its known cases, but this is undoubtedly due to the superior Swiss diagnostic methods. Many cases are of necessity missed in the U. S., notably among the negro and Indian population, where adequate attention is impossible. As public education increases and physicians become able to make earlier and more accurate diagnoses, a greater number of cases in the United States will doubtless be reported.

Skin cancer is now considered a curable condition, if it can be taken for treatment early enough. It comprises 3% of all cancer mortality, but this is due to faulty diagnosis and treatment.

Dr. Wild made a strong plea for the need of education in breast cancer cases, urging that women be taught to let any breast lump alone and to consult a physician at once concerning it. Usually such a formation is repeatedly disturbed and palpated before the physician sees it—in fact, massaged, a procedure which is deliberately employed with experimental animals to further metastasis of cancer growths. What wonder, then, that so many breast cancers present an inoperable condition to the surgeon?

Discussing electricity, cauterization, and the knife in removal of cancerous growths, Dr. Wild said that in his opinion the knife is preferable.

Rabid Dog Found; County Health Notes

Early in March a Santa Fe girl was bitten by a dog. The animal was killed and examined and found to be rapid. The girl was given the Pasteur treatment and had no bad effects. Dr. H. P. Mera, county health officer, declared a quarantine on all dogs and arranged for their inoculation wherever possible. Like all southwestern cities with a large Mexican population, Santa Fe numbers about as many dogs as humans. The actual extent of this rabies scare will not be evident for some months yet, as its incubation period is long. Meanwhile many dogs have been disposed of, very slightly reducing the canine population; and the quarantine is being rigidly enforced.

A few diphtheria cases have appeared, but there

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was no epidemic. The same is true of the "'flu" conditions.

Harvey Hotel in Santa Fe

The Santa Fe Transportation Company (part of the Fred Harvey system) has secured La Fonda, Santa Fe's best hotel, and they will take possession June 1. This hotel is built on the site of the old inn, or "fonda," which sheltered visitors to the oldest capital in the early days. It was built by popular subscription in 1923, to fill a need for a good hostelry in Santa Fe, following the burning of the old DeVargas hotel in December, 1921. Under the Harvey management, La Fonda will serve as a stopping place for tourists taking the new Indian Detour in connection with the transcontinental trip over the Santa Fe railroad. W. G. Sargent, present manager of La Fonda, will manage the DeVargas hotel.

Personals

Dr. James A. Massie has returned to Santa Fe after spending two months in the east and in his old home town of Toronto, Canada.

Dr. Leigh K. Patton of Sunmount Sanatorium, has been elected a member of the Santa Fe Rotary Club, classification, "Hospitals." The other medical men among this club's 33 members are Drs. H. S. A. Alexander (secretary of the county medical society) and J. A. Rolls. The local Kiwanis club has over 60 members, among whom are Drs. R. O. Brown, E. A. Fiske, Joseph Foster and F. E. Mera.

MARICOPA COUNTY (Ariz.) MEDICAL SOCIETY

Feb. 17th, 1926.

Dr. Drane in the Chair.

The second meeting of February was held as a joint session with the meeting of the Medical Section of the American Association for the Advancement of Science. Following dinner at the Country Club Dr. Wm. J. Kerr, Professor of Medicine at the University of California, San Francisco, and Dr. Gerald B. Webb of the Colorado University School of Medicine addressed the meeting. Dr. Kerr's subject was "Cardio-Renal Complex." Dr. Webb presented an appreciation of the life of Laennec in honor of the centenary of his death. He showed by lantern slides a rare collection of pictures illustrating the times of Laennec.

Dr. Drane suggested that Maricopa County Society apply for affiliation with the Southwestern Section of the American Association for the Advancement of Science. Dr. Webb offered to ascertain for the society the steps necessary to such affiliation.

VICTOR RANDOLPH,
Secretary.

MARICOPA COUNTY (Ariz.) MEDICAL SOCIETY

Meeting March 6th, 1926, at Deaconess Hospital. Dr. Randolph in the chair in the absence of Dr. Drane and Dr. Stroud, Dr. McIntyre acting Secretary. The following members signified intentions of attending the State meeting at Globe: Doctors Carson, Clohessey, Edgar Brown, Ross Martin, Franklin, Shelley, Bailey, Smith, Greer, Sweek, Harbridge. Mr. C. R. Holton, attorney, addressed the Society on "Medico Legal Points Involved in Malpractice Suits." Mr. Holton's talk was of great interest. Considerable general discussion followed including numerous questions which Mr. Holton kindly answered. A vote of thanks was tendered to Mr. Holton for his talk.

Dr. O. H. Brown presented an interesting review and discussion of Sinclair Lewis' book "Arrowsmith" Following discussion of this paper Dr. Sweek spoke of the need for a new state medical

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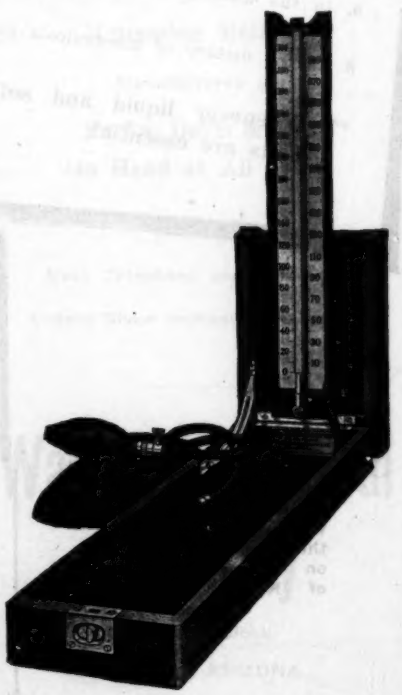

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practice act and urged co-operation among the doctors in furthering such a law.

Twenty-eight members and three visitors were present.

MARICOPA COUNTY (Ariz.) MEDICAL SOCIETY
March 20, 1926.

Held at Arizona Club, Dr. Drane presiding.

A joint meeting between Maricopa County Medical Society and Yuma County Medical Society was preceded by dinner for doctors and their wives at 6:30 p. m.

The following guests from Yuma were present: Dr. and Mrs. Shields, Dr. and Mrs. Siberts, Dr. and Mrs. Ketcherside, Dr. Reese.

Speeches of welcome to the guests were made by Dr. Drane, Dr. O. H. Brown and by Mrs. T. E. McCall, president of the Ladies' Auxiliary.

Following dinner the ladies adjourned to the theatre.

Medical Meeting: Dr. Watkins moved and it was seconded and carried that the minutes of the previous meeting be dispensed with. Dr. Watkins advised the Society that the Arizona Republican wishes to accept medical articles signed by the doctors who write them. Dr. Carson moved and it was seconded by Dr. O. H. Brown, that such articles be submitted for publication. Dr. Smith objected. Dr. Randolph objected. Dr. Holmes asked if the articles could be signed by the Society. Dr. Stroud objected to the motion. Dr. Yandell moved that the motion be laid on the table—seconded by Dr. Watkins. Carried.

Telegrams from Dr. Rowntree read, accepting invitation to speak before the Society on Monday, March 29th.

Letter from Dr. Forest of Yuma, regretting absence on account of illness, was read.

Program: "Ruptured Gastric Ulcer," Dr. Ketcherside of Yuma.

Discussion by Drs. Greer, Smith, Reese, Carson, Watkins, Sweek, Randolph, Shields. **Dr. Watkins took detailed notes on the discussion of this and subsequent papers, which will appear with the papers in Southwestern Medicine.**

"Rabies"—Dr. Geo. Shields of Yuma.

Discussion by Drs. Ketcherside, Mills, Carson, O. H. Brown, Vivian, Watkins, Sweek, Holmes, Drane, Purcell, Wilkinson, McIntyre.

"Occipito-Posterior Positions in Obstetrics"—Dr. H. A. Reese of Yuma.

Discussion: Drs. McIntyre, Greer.

Dr. Randolph moved and Dr. Carson seconded that arrangements be made for semi-annual joint meeting with the Yuma County Society. Carried unanimously.

There were present thirty-nine members and seven visiting doctors.

VICTOR RANDOLPH, Sec'y.

JOINT STAFF MEETING

(Continued from p. 148, March Issue.)

First Entrance:—May 17th, 1922:—Married woman, age 50.

History:—Has never had any acute illness outside of childbirth, but has complained of slight pain in the right quadrant of the abdomen for several years and has had in the past six months two slight, but rather more severe attacks of pain lasting for a few hours, in the epigastrium and on the right side. Was taken with severe pain a few minutes after eating hearty dinner at 6 p. m. and evacuated the stomach completely within twenty minutes after eating, stomach being washed out and fluid returning clear. Pain, however continued throughout the night, with one attack of emesis after midnight.

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Any physician or surgeon in the Southwest, who cannot accompany patients to Phoenix, is invited to refer them direct to the Hospital. They will be placed in charge of ethical members of the Staff.

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SISTERS OF MERCY

At 9 a. m. was still suffering with pain, with white count of 15,400, polys 92%. Diagnosis was probable appendicitis. Urine examination showed 1.8% sugar Operation considered, but policy of waiting pursued. Symptoms continued same. Next day urine showed no sugar and abdominal symptoms and constitutional symptoms showed exaggeration. Sent to hospital.

Examination:—Temperature 102, with slight tympanites. Abdomen moderately distended, rather more marked tenderness in right side of epigastric region; certain amount of muscular rigidity all over abdomen.

Operation with diagnosis of acute appendicits. Appendix found retrocecal and bound down with adhesions, apparently acutely inflamed. Large amount of blood stained fluid in the abdomen not accounted for by the appendix condition. Temperature went down until fifth post-operative day, when it began to pursue a very irregular course, somewhat typhoid in character. Widal reactions were negative. There was some distention and gastro-intestinal x-ray was made without showing obstruction, and without definite evidence of gall-bladder disease. Patient discharged June 21st, 1922, 35 days after operation, with temperature of 101.

Second Entry January 29th, 1926, with the following historical notes:

"In June, 1922, was operated for acute appendicitis (after some delay because of sugar in the urine). Following operation a negative urine was obtained. Patient had a stormy recovery. She was pronounced diabetic and cooperation was sought for effective treatment. No proper cooperation could be secured on the part of patient or her family. With anomalous diabetic regimen, the urine could not be kept sugar free. At different times, we sought to secure a proper diet under a nurse. She was last seen about a year ago. Today she was found in coma and brought to the hospital."

Examination:—Temp. 103 rectal; pulse 112; resp. 32. Poorly nourished woman in coma; pupils equal and reacting sluggishly to light and accommodation. No rigidity or glandular enlargement. Expansion equal, respirations rapid, breathing stertorous; few coarse rales scattered throughout both lungs. Heart beat rapid; apex beat not perceptible on inspection and quite indistinct to stethoscope. No definite heart enlargement. Abdomen somewhat distended; no palpable masses; no liver enlargement; other examinations negative.

Three urine examinations of specimens by catheter at 11 a. m., 1 p. m. and 4 p. m, showed, respectively 2.9 percent, 2.5 percent and 2 percent of sugar, with acetone and diacetic acid in each; albumen, hyaline and granular casts. White count 11,200.

She was given insulin and 50 percent dextrose intravenously, with glucose and soda per rectum. Patient became able to swallow and talk incoherently; she never regained consciousness completely, and died the next day.

DR. CHAS S. VIVIAN was asked to discuss this case, and the general management of diabetes with or without insulin, which he did at considerable length and in a very instructive manner.

Dr. Tyrrell closed the meeting by commenting on the staff presentations. He calls attention to the necessity for discussing the cases which are not properly handled, as well as those which are. He exhorted the staff members not to be afraid to criticizze or be criticized, when this is done in a courteous manner and with the idea of improving the service in the hospital and the clinical records.

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ST. JOSEPH'S HOSPITAL (Phoenix) STAFF

This meeting was attended by twenty-seven members of the staff, the following three cases being presented and discussed:

The first case was one whose present diagnosis is MULTIPLE MYELOMA, and its clinical record was summarized by the secretary, as follows:

The first entry into the hospital was March 24, 1924, just two years ago. Came in with a severe back pain which had been steadily increasing in severity. Examination showed area of tenderness to the right of the fourth and fifth lumbar vertebra, quite severe at times. There was enlarged prostate and urethral stricture.

X-ray examination showed defects in the fourth and fifth lumbar arcnes and first sacral arch, with some displacement forward of the fifth vertebra (spondylolisthesis). The defects in the vertebral arches had some suggestion of bone destruction. Patient's urine showed albumen, casts and many pus cells, and he was kept in hospital on a nephritic regime. Spine was manipulated and this gave almost entire relief from the pain.

On second entry, Sept. 7, 1925, cystoscopy was performed, with cystogram, with no conclusive findings.

On third entry, Oct. 12, 1925 he came for lung hemorrhage, a more detailed physicial examination was made, as follows:

Head: Has five areas of tumor formation, one above the left eye about the size of an orange, soft in center and very hard at periphery; there is another posterior to first, and nearer the junction of parietal and occiupital, smaller in size but not soft in center; there are two others in the occipital and parietal regions on right, smaller and hard. Hair does not grow over these areas. Pupils react to light and accomodation. There is no perforation of nasal septum. Teeth absent; no evidence of syphilitic stigmata. No enlarged glands in the neck; no enlarged thyroid.

In the lungs, numerous fine rales distributed throughout both lungs, most of which clear up with deep inspiration and cough. The apex beat seen and felt indistinctly in the sixth interspace twelve cm. from the midsternal line; first sound clear and distinct, second not so clear; nothing abnormal in tricuspid area; a soft blowing sound is heard over the entire base but loudest at the aortic area and just a sign of humming at top. Aortic and pulmonic second equal; no definite Corrigan pulse. B. P. 160/90.

Abdomen soft, spleen not palpable; no tumor masses.

Cystoscopy showed hypertrophied prostrate median lobe producing residual of four ounces; lateral lobes showed moderate hypertrophy; notch well defined.

Skin dark, dry and wrinkled with a few areas of lighter color suggesting leukodermia.

Right elbow is stiff and forearm held in position of flexion; wrist freely moveable but no pain on slightest motion.

Romberg negative; knee jerks present, equal and active.

X-ray examination showed dilated aorta, and an irregular patchy density through the lung fields, not suggestive of tuberculosis. It was thought that there was aneurism and bleeding caused by this lesion, rather than lung disease. Wassermann was negative.

The x-ray of the head showed bone involvement in the location of the tumors, in the form of rounded areas of bone absorption, fairly well circumscribed.

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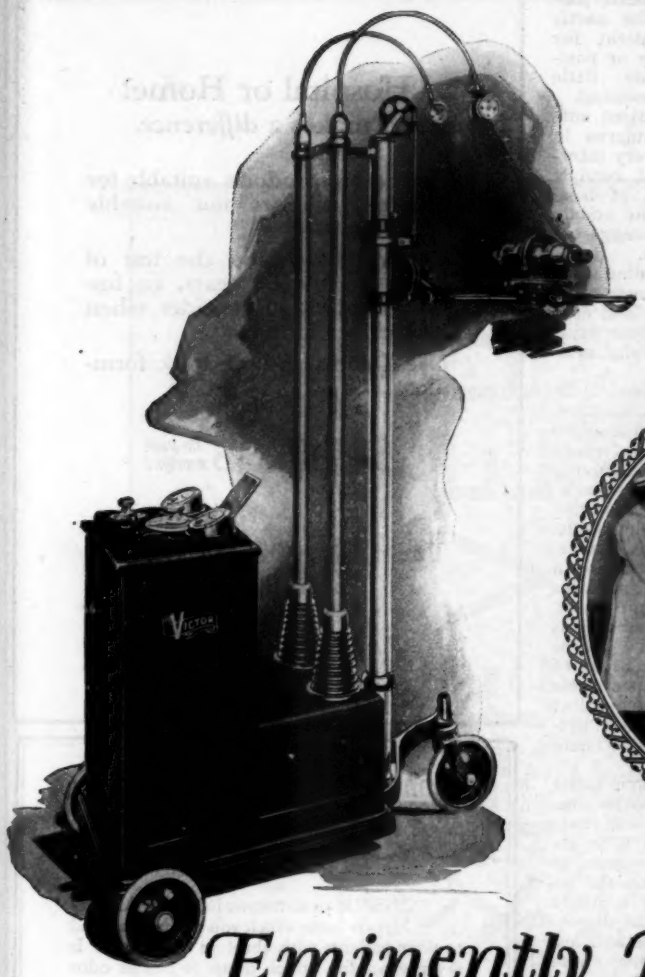

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Opinion was given that they were either multiple gummas or metastatic carcinomas of the skull, possibly from prostate. The presence of the aortic lesion led the clinician to treat the patient for tertiary syphilis in spite of lack of history or positive Wassermann. This treatment made little change in the condition. Patient left the hospital.

COMMENT. Some weeks later, this patient suffered a spontaneous fracture of the humerus in his right arm, and x-ray at home showed very interesting bone pathology. In the external condyle there was a rounded, punched out area of bone destruction and a large similar area in the middle of the bone. Dr. Mills, at this time, suggested multiple myeloma as a probable diagnosis.

The lesions are consistent with the diagnosis. There is no Bence-Jones proteinuria, however. We have abandoned the diagnosis of gummas and consider the probable diagnosis to be multiple myeloma, with a possibility of the lesions being multiple metastases of carcinoma.

DR. H. P. MILLS: Myeloma is considered to be a new growth in bone; it is supposed to arise from the bone marrow. It seems to have a preference in the bone marrow. It seems to have a preference for the short flat bones, though sometimes involving the long bones also. It remains as a bone tumor, though there have been instances of its being carried as mestastases to liver, spleen or lymphoid tissue, but it is a question whether these were really myelomas. Bone tissue is destroyed in myeloma by a process of softening or erosion, so that fractures are liable to occur. The tumor itself is quite soft, has a grey-reddish appearance on section and is very cellular with little fibrous structure. These lesions in the bone are shown by x-ray as areas of lessened density. There is usually considerable toxemia in these cases and in most cases a peculiar albumose appears in the urine (Bence-Jones protein). This was never found in this case. There are no constant blood findings.

I have never come in contact with but one other case, but that one was very interesting to me, because it occurred in my brother who died some years ago. The symptoms appeared in him as a severe lumbago or sciatica. He was a very active man, 40 years of age; he thought he had slipped on the ice and wrenched his back. It was only after a month or two that the nature of the condition was discovered, and I do not think it was entirely established until after death and autopsy. His lesions were chiefly in the lumbar spine and ribs.

DR. G. B. COUCH: The patient was very low when first seen by me. Since no hope was offered by any other treatment, thought would see what colloidal gold would do for him. Has been taking this for two months and shows decided general improvement; The colloidal gold is being given intravenously twice a week, two c.c. at a dose. There are some tumors in the abodomen and do not know what they are.

(Note: Subsequent developments in this case have again brought the possibility of multiple carcinoma metastases into the foreground.—Ed.)

Case of Tuberculous Miningitis: Presented by DR. JAMES E. DRANE: Male infant, age 10 months. The mother states that she was in an auto accident when baby was three and a half monthls old, following which she had to wean him. They were unable to find foods to agree with the child; he lost weight and was fretful all the time. About a month ago his condition seemed to improve; but about two weeks later he caught cold which settled in head and chest. About a week after he began being troubled with cold a physician was consulted about his diet who advised to continue the same formula. Medicine was given for the baby's cold but this did not improve. On Tuesday, Feb. 9th, he acted rather

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strangely; eyes were glazed; physician was called but nothing was done for the child. Tuesday evening, he had a convulsion and physician was called who advised that he be placed in the hospital immediately.

Examination showed pulse very rapid 100 to 180, fontanelle throbbing not bulging at first, but afterwards showed some bulging. Pupils sluggish but co-ordinating. Slight neck stiffness with some retraction at times. Heart was first irregular but later quite regular with varying rate. Babinski and Kernig both positive. White count was 34,000.

After the first night, had no more convulsions, but was very irritable and with offensive stools; for several days had no convulsions and began to think it might not be meningitis; then restlessness increased and head retraction appeared again, so spinal puncture was done on the 15th. Spinal fluid was under great pressure, clear with 120 cells per cu. m.m., without organisms being found. Spinal puncture relieved the symptoms for a time, and thereafter one or two punctures a day were done for relief of symptoms, in preference to using drugs. He lived until Feb. 26th. Tubercle bacilli were never found in the fluid, though we were quite certain of this diagnosis of tuberculous meningitis.

DR. R. P. MILLS: In the autopsy,, the dura was found injected and firmly adherent over the vault. The pia mater was slightly thickened and cloudy over vault and the vessels markedly injected. Over the base the pia showed marked thickening and a roughened appearance due to diffuse, irregular infiltration and very tiny greyish nodules. The lateral ventricles were greatly dilated and contained excessive amount of clear fluid. Microscopic sections of basal portions of brain, including pia showed characteristic lesions of tuberculosis. Other portions of body not examined.

Anatomical diagnosis: Tuberculous Meningitis.

The point of interest to me is the amount of fluid that accumulates in these cases. There was an old term that we do not hear very often now and that is "acute hydrocephalus," from the basilar type of meningitis. Tuberculous meningitis frequently has dilated ventricles and fluid accumulates rapidly after being withdrawn. In this patient, we were withdrawing from 60 to 100 c.c. of spinal fluid twice a day for several days and still could not keep the pressure down. This is probably due to the inflammatory exudate being thrown out around the basilar vessels interfering with the return circulation. The ventricles receive the greater amount of this fluid and become so dilated that the brain cortex is much thinned out. The inability to find tubercle bicilli is probably due to the scarcity of organisms. In tuberculous meningitis the exudate is more firm and plastic than in the purulent type and there is very little phagocytosis, so that few organisms are carried into the surrounding fluid.

DR. H. R. CARSON: Wish to compliment Dr. Drane on getting an autopsy in this case. Parents usually do not like to have the child mutilated, but when it was presented to them that they might safe-guard other children, they consented.

At the time I saw this baby in consultation, the abdominal symptoms had cleared up and it was simply a matter of the nature of the meningitis. I never saw a case get well, but there are cases on record, where tubercle bacilli were found in the spinal fluid, and the patients have recovered. The idea of continually draining the canal was not with the idea of curing the child, but simply to make it more comfortable. Usually once a day is sufficient to withdraw fluid, but in this case it had to be done twice a day. Is not the distension of the ventricles due t othe closure of the foramen?

DR. MILLS: The exudate no doubt inteferred somewhat with the passage of the fluid, but the fact

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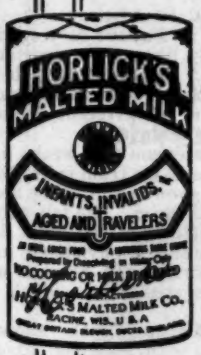

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that each tapping relieved the pressure, showed that there was not complete closure.

Case 3. Chronic Interstitial Nephritis.

DR. FRANK J. MILLOY: Patient is a white married man, age 61. Family history unimportant. Past history without interest. Claims to have been in good health until rheumatism began three years ago. He has been in the care of different doctors during the past two years for arthritis.

Left the Battle Creek Sanatorium two weeks ago where he had been for five weeks. On train from Denver to Phoenix, he developed severe pains in the head and his nose was colgged with blood. He felt warm and oppressed. Wednesday afternoon the pains became more acute. He consulted a phyisician and blood pressure of 212 was found and he was advised to enter the hospital for treatment,—which he did on Jan. 6th, 1926.

Laboratory reports from Battle Creek showed some abnormalities in urine, with polyuria, excess acidity, trace of albumen, hyaline casts. There was slight secondary anemia; NPN was reported 31.9 and 54.2, wtih urea nitrogen 33.1. Total phthalein elimination was 39 in two hours.

Phys. Exam.: Rather portly man, pale, pulse 84 and bounding. B. P. 212/120. Pupils equal; teeth in good condition, tongue coated, eyes showing evidence of recent retinal hemorrhage. Chest negative. Apex beat inside nipple, heart beat faint, no murmurs. Joints somewhat enlarged and painful. Patella reflexes present and equal.

Urine: Sp gr. 1006, 1001 and 1002; albumen positive; no casts; phthalein elimination 4.5% in two hours.

On Jan. 5th, the NPN was 60 mg., Urea N., 50 mg.; Urea 107 mg. Creatinin 4.3 mg; chlorides 575; red cells 3,4440,000 white cells 11,000 Hbg., 50%. Wassermann negative.

Jan. 11th: NPN 120 mg.; Urea N., 60 mg.

Jan. 13th: NPN 111mg.; Urea N. 75 mg.

Jan. 20th: Sugar .22%; Urea N., 67 mg., NPN 109 mg.

Jan. 20th: Sugar .14% Urea N., 60 mg.; NPN 86 mg.

Jan. 28th: Sugar .15%; NPN, 48 mg.; Urea N., 27 mg.

Nosenthal functional test showed some fixation of gravity (range was 1006 to 1012), with nocturnal polyuria, the specimens having albumen and hyaline casts.

Diagnosis of interstitial nephritis with hypertension.

On Jan. 7th there was a pulmonary hemorrhage, supposedly from the high pressure. On the 12th mind was not clear, with mumbling when he tried to talk; there was strong uremic odor on breath. This condition and the lung moisture which followed the hemorrhage gradually cleared.

General condition improved along with the laboratory findings, blood pressure coming down to 180/90.

He left the hospital on Jan. 30th because he was too tall for the bed and could not be comfortable. He went to the hotel and continued to improve; the blood chemistry on Feb. 13th showed urea N. 30 mg. and NPN 50 mg., creatinin 2.3 g.

He developed herpes zoster about this time which kept him in bed and upset his stomach. he vomited and bowels were constipated. Then he developed a lobar pneumonia, and had crisis on the third day. After this he continued to vomit, and finally went into stupor and died.

DR. W. W. WATKKINS: Wish to comment on the case from the viewpoint of the clinical record. We were told by the Staff Visitor of the College of Surgeons recently, that the first two things the record should present were (1) a clear description of what is the matter with the patient, and (2) a word picture of his "physical reserve." That is, it should not only tell how sick he is in those organs where he is sick, but also how well he is in vital organs not affected. We are taught that a man cannot die until one or the other of three systems go out of commission. Either the circulatory, the respiratory or the nervous system must cease functioning before the human organism dies. Therefore whatever is wrong with a man, the integrity of those symptoms should be pictured in the clinical record.

That has been done very well in this record, and Dr. Milloy has attached to the record all the laboratory records which this man brought from Battle Creek, and all the records of examinations made on him prior to his entrance to the hospital.

It is a very complete record of a very common condition. Ordinarily we see the clinical records stating simply that a man has chronic nephritis, which is about as intelligible as saying that he has a broken bone, without saying which bone or the kind of fracture.

DR. WILLARD SMITH: Would suggest one practical point from my personal experience. When I was in the hospital, they put two beds end to end, and I was able to stretch my more than six feet of length out in comfort

DR. WATKINS stated that the case of glioma of the orbit which was presented a month or two ago was again in the hospital with recurrence and that Dr. Bailey had removed the gold sphere. There is now evidence of bone involvement about the orbit. Another course of radium is to be given, with little hope of benefit this time.

Adjournment at 9:50 p. m.

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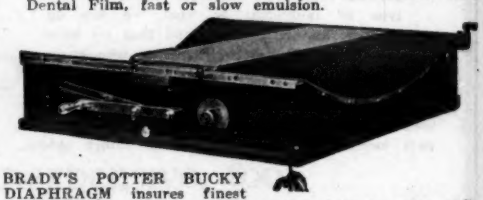

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The members of the party will sail from New York on April 28th, a few days after the meeting of the American Medical Association at Dallas, Texas, thus, giving the physicians of the party plenty of time to attend this meeting.

The assemblies are open to members of the profession who are in good standing in their state or provincial society with no restriction to territory. This invitation is understood to be extended to the entire medical profession of North America.

Admittance to the clinics and privieges of the tour will be protected by the issuing of an admittance ticket or card. This rule will be strictly enforced in order to protect the association in its membership requirements, which is, that a physician must be in good standing in his state or provincial society. We will not be responsible or admit physicians to privileges unless they are members of the group.

Physicians may return home on three separate sailings during the main assemblies. First, at the end of the visit to Italy and Switzerland by way of Cherbourg; second, at the end of the visit to Holland from Rotterdam and third, at the end of the assembly in Brussels from the port of Antwerp.

It is necessary in order to hold space for the assemblies to send to the office of the managing-director, W. B. Peck, Freeport, Illinois, the sum of $65 per person.

A second section of the assemblies for a limited number will be conducted during the summer months for those who are unable to take adavantage of the April sailings. The members of the party will leave New York, S. S. "Pittsburgh" on June 19th, return sailing, August 13th from Antwerp, S. S. "Zeeland."

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